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DEMOGRAPHIC TRENDS AND TRANSPORTATION DEMAND

HEARING

BEFORE THE

SUBCOMMITTEE ON WATER RESOURCES, TRANSPORTATION, AND INFRASTRUCTURE

OF THE

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE

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DEMOGRAPHIC TRENDS AND TRANSPORTATION DEMAND

THURSDAY, FEBRUARY 7, 1991

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
SUBCOMMITTEE ON WATER RESOURCES,
TRANSPORTATION, AND INFRASTRUCTURE
Washington, DC.

The committee met, pursuant to notice, at 10:00 a.m. in room 406, Dirksen Senate Office Building, Hon. Daniel Patrick Moynihan [chairman of the committee] presiding.

Present: Senators Moynihan, Reid, Symms, and Lieberman.

OPENING STATEMENT OF HON. DANIEL PATRICK MOYNIHAN, U.S. SENATOR FROM THE STATE OF NEW YORK

Senator MOYNIHAN. A very good morning.

Let's see. We have Professor Deakin. We have Doctor O'Hare. Good morning, sir. Doctor Pisarski, good morning to you, sir; and Mr. William Johnston. There you are. You're all there.

I want to thank you all for arriving here by rail if you had any wits about you. As you know, we are in the process of writing what is generically called the Highway Bill and is properly the Surface Transportation Act of 1991. This is legislation that is enacted every five years. We have for the last 35 years—basically just putting it first in place and then continuing the Interstate Highway Program, the largest public works program in history and one which is now completed.

The issue arises whether we have anything new to add to the subject of transportation. I am not sure. My impression is that there are no ideas. If there are ideas, there is no energy. I have a fairly close attachment to the Interstate System as I think it is generally agreed, although there is no real history written, that we begin at the General Motors Futurama Exhibition at the World's Fair, the 1939 World's Fair in Flushing Meadow in New York. I was then 12 years old, and I was privy to a hole in the fence at the fair. I used to go out there a lot and saw all the things that you could see. Some were interesting.

There was the Trylon and the Perisphere, you remember those symbols. Moses at his best. But it was that city of the future that GM put on. You saw these elevated highways with no intersection, no red lights and cars moving across them and going through buildings and mountains and so forth. It was an absorbing thing.

In 1944 the Roosevelt Administration I think on the proposal of Robert Moses called for an interstate highway system as a post-war public works project. It was widely assumed that the Depression of the 1930's would resume the minute the second World War was over. Little did we understand the power of the home mortgage and the automobile industry. But it was in place and it poked along. It made its first appearance in New York where Bertram Tallamy, a great civil engineer under Governor Dewey built the New York State throughway which was, in effect, the first segment of the system. Calamitously we built it as a toll road and then provided the model for freeways for all the rest of the country. From the time that toll road opened to this moment, the size of New York State Delegation in the House of Representatives declined by one-third. So be careful about toll roads.

In 1955 with General Motors still very much on the scene, we changed this to the Interstate and Defense Highway Program and we commenced a gasoline tax and trust fund and proceeded to build them. At the time it was evident and some of us wrote that although called the Interstate Highway System, half the money would be spent in cities. We did not know how to put that large a thing through a city. It was kind of a learning that had just not developed. The money came in the form of very nearly a free good. At 90 cents on the dollar, how could you say no?

We smashed through the cities in a way that I think has permanently changed our civic fabric. We are not the places we were. We wrecked half the cities in the country, cut them off from the water, isolated the minority segments, created the suburbs. If ever the law of unintended consequences was around to be observed, it was there. Nobody complained because nobody knew the power of transportation. In any event, our committees just went ahead and did it.

Now it's done and I think cannot be undone; but you are going to tell us that. We became much more an automobile based culture, but then we were going to become that anyway I guess, weren't we? I see Roy Kienitz, of the staff, has faithfully produced the following: The population since 1960 has gone up by about 50 percent, but the number of cars by 250 percent which is, I think, a function of the system. Although that may be at an S curve that is about to get asymptotes because you don't seem to be able to fit anymore.

The problem of cars seems to be very large in a place like southern California; we're going to hear about that. It seems to dominate political discussions—what do you do about this automobile. I think the American cities that have survived will survive, and those that have been smashed have been smashed; there's nothing to be done. Too bad; we have made a mistake.

I wrote in 1960 that we are not able to do this; we don't know how to do it. Well, we did it anyway. So here we are. The question we will ask of you in terms of population movement is: Is there any thinking beyond the automobile? We tried to talk in the fifties of some sort of mass transit. Mass transit is a failed idea. It was a planner's idea just like in this piece in 1960 I quoted Paul Ylvisaker as saying of the city planners that it was a failed profession if you have any idea of the expectations we had of it in 1910, 1920.

So as I say, we don't know whether there is any alternative to the automobile. We have tried to interest the Administration in magnetic levitation; we have not succeeded. We don't have the dynamism. That dynamism has moved to Japan. The dynamism that would create this system in the fifties doesn't exist in our country in the nineties. I will end this monologue by saying that I was just reading John Hayes' eulogy to William McKinley which he gave over in the House. John Hayes had been Lincoln's Secretary and was McKinley's Secretary of State. He spoke of the prodigious prosperity of McKinley's administration and how the United States had turned from a debtor Nation to a creditor Nation and how the center of world commerce finance had moved over the ages from the banks of the Euphrates to the banks of the Seine and the Thames, and between dark and dawn had moved to the banks of the Hudson.

Well, we confront you a place where it seems to be sailing into Tokyo Bay at this point. I don't know what we're to do about that. As I say, basically we have no ideas. Well, we have names and things but no ideas. There's no way to undo what was done and no great capacity to do anything different until you inform us otherwise, and that's why you are here.

My dear friend, Senator Reid; good morning, sir.

OPENING STATEMENT OF HON. HARRY REID, U.S. SENATOR FROM THE STATE OF NEVADA

Senator REID. Mr. Chairman, I appreciate very much participating in this hearing. I think the topic of demographics takes on unique characteristics if you look at the State of Nevada. Nevada is one of the most urbanized States and one of the least densely populated in all the 50 States with but 9.5 people per square mile. Clark County which includes Las Vegas is the fastest growing metropolitan area in the United States. It contains over 60 percent of the State's population. It's now closer to 70 percent than it is 60 percent.

The neighboring county, Lincoln County, contains only 4,000 people but is larger than six of the United States. Not only is the State of Nevada an urban and a rural State combined in one, but we are the Nation's fastest growing State. From 1980 to 1990 Nevada grew by 50.5 percent. While from 1950 to 1990 the State of Nevada has grown 651 percent. Nevada is experiencing many of the demographic trends that I think will be identified by a number of the panelists.

Our senior population is also growing rapidly. We are seeing many young families move to our loop in the Sun Belt. Las Vegas in particular has a suburban population distribution, and many families have two bread winners. All of these trends could cause one to believe that Nevada leaders support the changes in the Highway Program outlined in the President's budget on Monday. Nevada has a relatively small number of interstate miles, 545, that serve a large percentage of the State's population. That is exactly the type of system that the proposed National Highway System is intended to benefit.

Yet the funding system that will, in reality, most benefit Nevada probably is the current system, albeit, with the need for more money. Despite being the fastest growing State, we are still one of the smallest. We have only about 1.3 million people. We also have the Nation's highest gas tax, although this is a distinction perhaps that we are going to share with others. Each penny of our gas tax generates just $6.1 million a year. If you had that same tax in the State of California, it would be in the billions of dollars.

Our State has made a supreme effort to address the effects of growth in our transportation system, though without the existing Federal program we probably cannot do it very well. To accommodate the growth described above and out of fairness, Nevada ought to have the same access to Federal highway monies that other States had during their years of rapid growth.

Mr. Chairman, I think it is interesting to note for the first time in the history of the State of Nevada, though, there is a dispute as to whether the present system is the best system. We had people in my office this week who were saying, well, maybe we don't like the present system. So because Nevada is maybe two States in one—one that's heavily populated. When I was in Congress, I served—it was hard to believe—a metropolitan area. I was really not much different than Congressmen from New York. We had the same problems of New York and many of the congressional districts in California.

So even in Nevada there are some people—it is a minority—but there are some people who are saying the present system may not work.

Nevada has another reason in the minds of the majority of the people of Nevada to support the current program. We are a bridge State. If you wish to transport goods to California from points east or even California, you will drive probably through some of Nevada's 50,000-mile road network. Nevada is proud to play its part in providing a national system of roads. But Nevada can only do this well if we get some help from the rest of the country to help with financing these 50,000 miles of roads.

Mr. Chairman, I want to comment you and your staff; the hearing that we had a couple days ago and now, this hearing, I think are outstanding. I again commend you and the staff for looking at the future rather than just talking about how things now are, recognizably not good. But I appreciate you and your staff going to the efforts that you have to have the fine people we had from the Federal Reserve Board and now these expert panelists.

Senator MOYNIHAN. You're very generous and you always are, sir. The far west and the Rockies are going to be well represented this morning.

I neglected to state that this is a meeting of the Subcommittee on Water Resources, Transportation, and Infrastructure. The distinguished Ranking Republican Member is our friend from Idaho.

OPENING STATEMENT OF HON. STEVE SYMMS, U.S. SENATOR FROM THE STATE OF IDAHO

Senator SYMMS. Thank you, Mr. Chairman. I will be very brief. I am pleased to have a chance to be here this morning. I regret I could not attend Tuesday's meeting.

You had more vision than I did, Mr. Chairman, and got off the Budget Committee.

Senator MOYNIHAN. I will say no other thing for myself in the 15 years of this body, but I did do that.

Senator SYMMS. I stayed on the Budget Committee. We had the Director over Tuesday and I could not get away. I welcome the opportunity, gentlemen and ladies, to hear from you this morning. It does not take long for the average driver to see what an inadequate highway system can mean for economic productivity and personal mobility. When people can't get to work, when truckers can't get to the marketplace, travelers can't get to the train station or the airport, productivity in America will decline and producers are less competitive in the world market.

As the 21st century rapidly approaches us, the United States faces new economic challenges here at home as well as abroad. Not surprising, many business leaders and economists are calling for more effective use of our labor and capital resources as a key to future economic growth.

According to the testimony the subcommittee heard on Tuesday, there is a growing recognition that traditional tools such as investment and transportation and other public works can provide a powerful force for stimulating economic growth and productivity if those investments are wisely directed and are properly utilized.

We can approach this authorization with some thoughtful caution and understanding that the interstate system is now nearing completion. I know several of my colleagues on the committee are particularly concerned about the rising congestion problems in our inner city and urban areas. Urban congestion adversely affects interstate commerce and our competitiveness in world markets. So we must deal with it in the context of this reauthorization bill.

I want to stress that the Transportation Act says rural areas are equally important for it is in those roads and highways that allow rural areas to ship agriculture products and natural resources to the market. Therefore, their improvement and maintenance are very important to the Nation's economic well-being and we must address those transportation needs in this bill.

Mr. Chairman, as we all can attest, transportation affects our daily lives more than almost any other public service, and I look forward to working with you and other colleagues on the committee and hope that we can reauthorize a strong well-funded Federal Aid Highway Program.

Just to note, Mr. Chairman, in view of the fact that we both serve on the Finance Committee which has an impact on this because of the revenue base for highway and transit funding, that it's my intention that at every legislative opportunity that comes up this year to offer to the Senate and, hopefully, the House, the opportunity to take the 2.5 cents a gallon of gas tax that now goes to the general fund for non-transportation funding and return it back to the appropriate trust funds—the one-half cent back to the transit and two cents back to highways. I asked that question to Director Darman on Tuesday. He, of course, is not in favor of that position, but I think it is fair to say that he fully expects Congress to do that. The question that I posed to him was: If they continue to keep the trust funds in the unified budget and spending outlays are not changed from the Administration's proposal which calls for up to about a $20 billion highway program at the end of the cycle, what would the impact be on the budget? He said there would be no impact.

I think this is something that we in this committee need to carefully analyze and look at because the people who believe in fuel taxes for other reasons—without getting into a debate on that, but for other reasons such as fuel conservation and national security and all those things—will be right back in asking for another seven and a half cents which is what they wanted last year.

So I think it behooves those of us who have a concern to improve the Nation's transportation sector, including fast rail service and highways, that we need to not allow the travesty that happened last year with that two and a half cents that went to non-transportation funding to remain. We need to move it back as soon as possible. This year and this budget I think would be an appropriate time. We will worry about the impact later on the political side of the argument because those people who are opposed to it say, well, then we will have more money in a trust fund. I think the Chairman has pointed that out time and time again that there is no money in the trust funds. It has already been spent. There is an IOU in there. It has been committed.

So I would hope that we could work on that as well as on the general aspect of improving the Nation's transportation system. I guess my opening brief remarks got longer than I meant, but thank you.

Senator MOYNIHAN. Senator Warner has submitted a statement and we will place it in the record at this point.

[Senator Warner's statement follow:]

STATEMENT OF HON. JOHN W. WARNER, U.S. SENATOR FROM THE COMMONWEALTH OF VIRGINIA

Mr. Chairman and members of the committee, I am pleased that this committee has begun the initial hearings which will provide the foundation for the discussion relating to the reauthorization of the Surface Transportation Act.

Today's hearing will help to show how changing demographic trends have had an impact on the demand for transportation infrastructure.

Changing demographic trends, by virtue of their economic implications, have far reaching effects on demand for public services and associated public capital investment. This is definitely true in the area of transportation, where demographic projections do provide the foundation of public policy planning. By anticipating population trends, projections can be made of future demands for transportation services. These, in turn, may be used to derive estimates of future capital investments for transportation infrastructure.

One could argue that the slowing growth rate of population and workforce reveals falling demand for transportation and reduced need for infrastructure investment in the future. However, these slowing trends signal a less rapid increase rather than a decreasing demand, so that infrastructure investment needs will increase less rapidly rather than decrease.

In the past decade, while Virginia's population grew 14 percent, travel in the Commonwealth increased by 50 percent, to more than 57.5 billion miles travelled on its highways. This year alone the Commonwealth will spend, from all sources, an estimated $2 billion on all modes of transportation, yet the needs continue to be evident.

It is clear that there is a substantial backlog of needs such as new construction and maintenance, and the mere increase in travel, regardless of what level, will only make the problem worse. The belief that changing demographic trends signal a period of reduced transportation needs is not supported.

Mr. Chairman, between July 1, 1956 and September 30, 1990, almost $4.5 billion in Federal funds were spent for the construction and reconstruction of the 1,069 mile Interstate System in my State of Virginia; and over $2 billion in Federal funds were used for the construction and reconstruction of other highways and bridges. The Federal Government has also been a partner in the recapitalization and revitalization of transit systems throughout the Commonwealth, spending $350 million during this same period.

The Commonwealth of Virginia, its local governments, and the private sector have dramatically increased their investments in transportation.

Virginia has demonstrated its commitment to providing superior transportation facilities and services through adoption in 1986 of a $10 billion, 10-year program. The program includes new revenue sources for all modes, creation of a multi-modal Transportation Trust Fund, and the use of creative financing methods such as special taxing districts, public/private partnerships and private funding for the construction of transportation facilities.

Now and in the future, Virginia is prepared to meet its transportation responsibilities, but expects the Federal Government to reassume its traditional role in the historical, Federal, State and local partnership through the development of a new, expanded national transportation program.

With completion of the original Interstate System, we must shape the new national policy to preserve and improve on the investments of the past and to meet the priority needs of the future.

Senator MOYNIHAN. Scholars, I think if I could make a suggestion that if we could proceed according to the almost random listing on the witness list. If each of you would speak for 10 minutes, that would give us a chance to talk among ourselves for perhaps another hour after that. That would bring us to about 12:30.

It is my very special pleasure to welcome an old friend, John Kain, who is the Chairman of the Department of Economics—gray beard there—of Harvard University who has worked with John Meyer in 1965; Martin Roll on the urban transportation problem. Classic statement on the subject and who has continued ever since.

Good morning, sir. All statements will be put in the record, so proceed.

STATEMENT OF PROFESSOR JOHN KAIN, CHAIRMAN, DEPARTMENT OF ECONOMICS, HARVARD UNIVERSITY

Mr. KAIN. Thank you, Mr. Chairman, members of the committee. Before I start my brief summary of my formal statement, I just might mention, in all deference to the Chairman, that support of toll roads seems to me a superior way of achieving turnover in the Congress than, say, a constitutional amendment. Thus, I would urge you not to reject tolls out of hand.

Senator MOYNIHAN. A very subtle economist's strategy.

Mr. KAIN. Dramatic changes have occurred during this past century in the size and shape of the Nation's urban areas, in the location of jobs and residences within these areas and in the extent and nature of urban trip making. For the most part these changes have been efficient responses to changes in technology and to rising per capita incomes. At the same time there are some important examples of market failure.

In large part, as you might suspect, these instances of market failure arise from the failure of governments who are the principal providers of highways and public transport services, to charge urban trip makers prices that reflect the long run social costs of providing these urban transport facilities and services.

In my written testimony, which I have supplied to the committee staff, I review the major trends in land uses that have occurred during this century and discuss the forces that account for them. Then I consider the distortions in metropolitan development that have been caused by the mispricing of urban transport facilities and services by Federal, State, and local Governments.

Senator MOYNIHAN. Can we just hear that once again. It may be the one thing we can do in this legislation that would mark any difference, which is the idea of pricing. You used the term mispricing.

Mr. KAIN. That's correct. The more general point is that the clearest example of market failure in the process of urban development results from the failure of governments to charge users for its investments in urban infrastructure and transportation facilities.

Since they are covered adequately in my written remarks, I'm going to skip over my discussion of the trends in land use in my opening statement. I want to proceed right to my discussion of what we can do to correct the distortions to metropolitan growth and development that arise from mispricing. These are not exactly new ideas, but——

Senator MOYNIHAN. Are you going to tell us what you mean by mispricing?

Mr. KAIN. Yes, I'm going to tell you what I mean by mispricing.

As I indicated, I'm going to move right to the issues of mispricing, the distortions that are created by it, and what we ought to in terms of public policy.

It is widely believed that the congestion has been getting much worse during the past decade or so and there is a good deal of empirical evidence that supports this view. It is widely believed, moreover, that congestion and the most serious growth in congestion is increasingly occurring in suburban areas and in rapidly growing Sun Belt metropolitan areas, such as Dallas, Houston, and Los Angeles.

These and similar estimates of the extent and the growth of congestion, as well as a variety of doomsday projections of future congestion levels, have been widely used in efforts to justify major new highway programs, often with data showing a growing gap between highway use and highway investment. While a massive highway program would, in fact, reduce congestion in many metropolitan areas, it would do very little to improve conditions in many others, and by itself would be a highly inefficient approach to reducing congestion.

A couple of decades ago I observed that 90 percent of the urban transportation problem—and for that matter, congestion—was caused by the gross mispricing of perhaps 5 percent of the Nation's highway capacity. While I would not want to claim too much for the precision of these fractions, either currently or in the past, the general point still remains. When we refer to serious and growing congestion, it should be clearly understood that we are talking about a problem that arises from gross mispricing, 5 percent of highway systems.

Senator MOYNIHAN. Doctor Kain, do not assume that our committee knows more than it does. Don't hesitate to spell out what 5 percent was mispriced and in what direction.

Mr. KAIN. As a first approximation, where the most serious congestion occurs, mispricing is most prevalent. The problem arises because we have a system of pricing for our roads, if you want to call it that, that as a first approximation, except for congestion, charges vehicles the same amount for every mile driven. As the members of this committee clearly understand, however, there are huge differences in the cost of producing highway capacity in various parts of the Nation and in various parts of the same urban area. In these areas that are built up and most congested, it is prohibitively expensive to provide additional highway capacity. Governments ignore these differences in the cost of producing additional road space. They treat street/highway space as though it costs the same amount to produce a mile of road in rural North Dakota as in Meinhalten.

The huge difference in the cost of producing additional highway capacity and the practice of governments to charge the same amount for it is the heart of the problem. The reason we have congestion is that congestion, by default, becomes the allocation device. It becomes the mechanism for rationing urban highway space. We have defaulted to congestion and, unfortunately, congestion is an enormously inefficient allocation device. The proper corrective measure is to begin to charge vehicle users, either through direct pricing schemes or through more indirect methods that mimic pricing, amounts that more closely approximate what it costs society to provide additional capacity at that time or location.

As I indicated previously, while a massive highway program would reduce congestion in many metropolitan areas, in many others it would accomplish very little, particularly those that have become highly developed. At minimum, simply building more roads would be an incredibly inefficient way to deal with congestion as governments fail to charge appropriate amounts for road use.

What I would like to do now, in the few minutes I have left, is briefly suggest some new directions for public policy. These are not new ideas. Unfortunately, however, a review of current Federal, State, and local legislation and practice, might lead you to think they are new ideas. That is, they have had very little impact on policy.

The first and most important thing that this committee, or more correctly, this Congress, could do would be to eliminate employer parking subsidies. The elimination of free—that is, subsidized—parking and an increase in the amounts commuters to dense employment areas have to pay for parking would have a dramatic impact on the levels of congestion on facilities that serve these centers, would encourage many more urban tripmakers to choose modes that are efficient users of costly urban street space, and would, thereby, significantly reduce the levels of highway investment required to achieve a given level of mobility.

The elimination of parking subsidies would do more than any other single measure to reduce the mispricing of urban highways and the distortions of urban development that they create.

Senator MOYNIHAN. Do you have any quantified estimate of what the parking subsidies are?

Mr. KAIN. The extent or what the effect is?

Senator MOYNIHAN. Just how much is spent?

Mr. KAIN. Pickrell estimates that—this is in my statement—if you eliminated current parking subsidies, something like 20 percent of current auto vehicle trips would be made either in carpools or by transit. These trips, moreover, disproportionately occur in parts of the city and during times when congestion problems are most severe. Parking subsidies are largest in the most dense and congested centers.

Senator REID. Mr. Chairman, I'm someone from a rural area. I do not understand the parking subsidy.

Senator MOYNIHAN. The employer says use our parking lot, and it is not taxable.

Mr. KAIN. In rural areas, eliminating parking subsidies would have little or no impact, but in dense, high congested central areas the impact would be both very large and highly beneficial.

Senator MOYNIHAN. Use my parking lot in the basement of the high-rise.

Mr. KAIN. Parking subsidies more than anything distort patterns of trip making and leads to inefficient mode choices; eliminating them is the single action, you could do easily, that would have a big impact.

The second measure that I would urge you to consider is a sharp increase in gas taxes. While gas taxes are a very imperfect way of charging for road use, there are still strong arguments for increasing them. Most of the higher gas prices would be felt in greater fuel efficiency. Even so, they would reduce trip lengths and total vehicle miles somewhat, and would encourage more carpooling and greater transit use.

The best available estimates of the effect of higher gasoline prices on transit use suggest a 1 percent increase in gasoline prices would lead to about a two-tenths of a percent increase in transit use. While this is a relatively small impact, it is by no means trivial. It implies a doubling of gasoline prices would cause a 20 percent increase in transit use and additional shifts to carpooling. Higher gas prices (taxes) is not a terribly efficient way of charging for road use. It has the same weakness as the present pricing system has in that it treats all trips the same. Nonetheless, it would be a move in the right direction.

Even without considering the beneficial effects of higher gasoline taxes and prices on urban travel, there are strong arguments for sharply increasing gasoline taxes. The Gulf War is a vivid reminder of the gains to national security that would accrue to the Nation from a reduction in petroleum use and imports. A huge trade deficit and a growing foreign indebtedness, moreover, rank among the Nation's most serious and difficult economic problems. Unnecessary petroleum imports are a major contributor to both.

If Congress wants to deal with the problem of trade and commerce moving to Japan and Europe, it should attack this unnecessary component of our foreign trade deficit. If we reduce unnecessary petroleum imports, we will begin to see a lot of that commerce move back to the Hudson.

My third recommendation would be to replace the Federal Discretionary Capital Grants Program for Transit with a single annual grant. The availability of Federal Discretionary Capital Grants for Transit—this is the so-called New Rail Starts Program—has encouraged regional transit authorities and governments to plan and build costly rail transit systems that at best do little to increase transit ridership and at worst lead to actual declines.

While advocates of inappropriate rail systems frequently try to justify them in terms of increased transit ridership, reductions in air pollution, reductions in highway congestion, and similar quantifiable benefits, it is clear that these transportation objectives have little or nothing to do with the persistent interest in building inappropriate rail systems in small and low density metropolitan areas.

It is easy to demonstrate that increases in transit use, as well as the various indirect benefits that are related to ridership increases, could be achieved at far lower cost by using other transportation investments and policies.

My fourth recommendation is to provide funding for the retrofitting of existing urban toll roads for transit use and to encourage toll road operators to implement toll schemes that encourage carpool and transit use.

While there are obviously both technical and legal obstacles to such modifications, the first step is to carry out feasibility and benefit cost analyses. If, as I suspect, such modifications would be a cost effective way of increasing transit use, the needed capital improvements should be made eligible for either Federal Highway or Mass Transit funding or both.

My final recommendation is to provide greater incentives for the construction of bus-carpool high occupancy vehicle lanes—so-called HOV facilities—as part of both new highway construction and the reconstruction of existing facilities. The growing experience with transitways, commuter lanes, and other bus-HOV facilities demonstrates the cost effectiveness of such facilities. When construction cost per round trip is used to measure cost effectiveness, the per trip cost of, say, the El Monte Busway, the Shirley Highway, and the Houston transitways are only 10 and 15 percent as much as the per trip cost of new federally-funded rail starts.

That is all I have to say for my opening.

Senator Moynihan. Ten minutes to the second.

Mr. Kain. I usually talk for 45 minutes.

Senator Moynihan. I think I recognize the continuity that finding that efficient automobile transportation is more efficient than rail which is what you and John Meyer found a quarter century ago.

Mr. Kain. That is efficient highway based transportation with appropriate mixes of bus transit and carpools.

Senator Moynihan. We have heard you, sir, and will get back to you.

Professor Kain and Professor Deakin are Berkeley graduates. Doctor Deakin is the Chairman of the Department of City and Regional Planning. We welcome you, Doctor Deakin. You might want to have some personal versions on Paul Ylvisaker's reflection 30 years ago that city planning was a failed profession.

STATEMENT OF ELIZABETH DEAKIN, PROFESSOR, DEPARTMENT OF CITY AND REGIONAL PLANNING, UNIVERSITY OF CALIFORNIA AT BERKELEY

Ms. **Deakin**. Thank you.

I will not echo the things that John Kain just said, although I agree with many of them. What I would like to talk about today is the many activities of State and local government concerning transportation, the environment, and urban development, which collectively are altering the framework in which Federal policy will operate, particularly in the metropolitan areas which house the vast majority of our population. The argument that I will make is that in addition to providing ways of funding highway programs, it is particularly important that this Surface Transportation Act foster innovation; that it strengthen the planning process to incorporate and reconcile both mobility and environmental objectives; so that it can increasingly recognize and accommodate opportunities for emerging technologies in both highways and transit; that it make use of new investment strategies and pricing policies, and that it help to create the kinds of institutions that are actually capable of carrying out multi-modal transportation planning.

Activities at the State and metropolitan levels show real possibilities for innovation in transportation. The States and the regions are, in fact, operating as test beds for new formats of institutional arrangements, involving both the public sector and the private sector. Pricing strategies are being assessed and, in some cases, would proceed but for Federal restrictions on the ability to impose tolls on existing facilities paid for with Federal aid highway money. Possibilities for moving funds around instead of having funds very tightly categorized as highway money or transit money would allow much more cost effective investment, and some areas are experimenting with flexible funding policies in order to capture that increased cost-effectiveness. If we can accommodate these innovative ideas that State, metropolitan, and local governments are trying out, I think we will make great progress.

We have heard that suburbanization is the watch word of the day in urban development and urban form; that suburban congestion and environmental impacts are the major problems of the day. That is very much true. However, there are several important aspects of these problems that are not widely understood but are worth noting.

One point is that a large part of the traffic that is causing the congestion in our metropolitan areas is not people on their journeys to work but, in fact, is people on shopping trips, personal business trips, and the many other activities that we all engage in. In fact, work trips turn out to be only about 30 percent of the vehicle miles of travel, and about 25 percent of the trips, on a typical day in a metropolitan area.

So policies that focus only on the journey to work may not be effective in resolving congestion problems, nor will such policies re-solve air pollution problems, nor energy consumption problems. This is the case not just in fast growing areas in the South and West, but also in the suburban areas of such mature cities as Buffalo, New York.

On the other hand, some of the trends that have been implicated in congestion increases probably are going to flatten out, and we will probably not have quite the doomsday of problems that have been talked about, based on straight-line projections. For example, auto ownership is nearing saturation levels. Nevertheless, the problems that we already have are going to be persistent and not easily dealt with.

Part of the urban transportation problem stems from a land development pattern that has arisen in large part because of not well thought out or misplaced subsidies of suburban development, with underpricing, not just of road infrastructure, but many other kinds of infrastructure. We have created a kind of suburban development that is prone to congestion, but at the same time, too low density to serve with conventional transit. If we operate conventional transit in these areas, we not only are losing a tremendous amount of money because there are very few riders, but in some cases we are actually worsening energy use and air pollution because running empty buses around is not a very efficient way to proceed.

Increasing numbers of metropolitan areas and a few States are recognizing this as a problem and are beginning to look at a combined set of strategies to put together highway and transit finance with land use planning and land development policy. Public infrastructure investment policy is being coordinated with private sector land development procedures, and public funds are being used as an incentive to structure urban form in a way that transportation will function better.

One example of this public-private transportation-land use activity is the use of development fees and exactions to pay for transportation systems. In California we have had as much as 30 percent of our highway program paid for by developer contributions and fees and exactions. San Francisco and a few other cities also have transit fees and exactions. But we also are finding that local government is using strategic transportation investment policy to help guide development to the areas that it can serve well and where it will be able to maximize the economic benefit of the investments that it is making.

Coordination of transportation and land use planning is also being coupled with the exploration of new kinds of financing. Again, with the private sector playing a large role, there is renewed interest in toll roads. (There also is interest, by the way, in use of tolls as an air quality strategy on existing facilities, though changes in law would be needed to do this on Federal-aid highways.)

With these new sources of money come new expectations—about the speed with which delivery of infrastructure will occur, and about the amount of say that local governments and the private sector who are contributing to this infrastructure finance will have about the shape of the program. That says that the kind of partnership among the Federal, State, and local governments and the private sector will need to be quite a different one from what it has been in the past. If there is not 90 percent Federal funds, there cannot be 90 percent Federal control over the shape of the program.

A third area of concern is environmental policy. In particular, the Clean Air Act Amendments of 1990 set forth very detailed requirements for transportation controls in metropolitan areas which are unable to meet national ambient air quality standards. The Act backs those requirements up with very tough provisions for conformity between transportation plans and programs and State air quality plans.

As a result, we need to rethink how we relate transportation, air quality, and growth planning in metropolitan areas. Similar initiatives in noise, in water resources and wetlands, and increasingly at the State level concerning such things as loss of farmland, are making more vigorous and explicit consideration of the environment and transportation's impacts on it an absolute necessity.

In sum, we see that forces of change in economic, social, and demographic factors have given us a different environment for transportation policy; but then so have the new financing mechanisms, the new emphasis on environmental policy, and the new emphasis on coordinated land use and transportation planning. Putting all these factors together, I think we are going to need to recognize that the new STA bill cannot just provide funds, but also must support innovation and creativity and provide the flexibility that is going to be needed by metropolitan and State organizations responsible for delivering transportation capabilities for their populations and their economic base. The challenge to Federal policy-makers is how to actually do that in the most effective way, to develop both funding and institutional arrangements supportive of innovation. It is one thing to talk about multi-modal planning; it is another thing to actually have it. We are going to need to think very carefully about how the STA can help support positive change.

Thank you.

Senator MOYNIHAN. Thank you, Doctor. We will get back, but I hope each of our subsequent witnesses will feel free to indicate where they disagree with something that was previously said or they very much welcome it.

We continue this issue on pricing; we hear pricing again. I observed that there was a very distinct non-response to my question of: Would you share Paul Ylvisaker's doleful assessment of 30 years ago that city planning was a failed profession? You are not under oath, Professor Deakin, and we can get back to that.

Doctor O'Hare, from the University of Louisville, The Urban Research Institute. In the old days, transportation was simply a matter of get on the ocean, find a river, and go up until you hit the falls and stop there which is how the French got to the Louisville. Good morning, sir; you are welcome. I should say that you are the Director of Population and Policy at The Urban Research Institute of the University of Louisville.

STATEMENT OF WILLIAM O'HARE, DIRECTOR OF POPULATION AND POLICY ANALYSIS, THE URBAN RESEARCH INSTITUTE, UNIVERSITY OF LOUISVILLE

Mr. O'HARE. That is correct. I also might add that I am kind of in between jobs. I just finished four years as the Director of Policy Studies at the Population Reference Bureau which is the venue where I have done this work.

First of all, I want to thank the members and the Chairman for inviting me to talk this morning. I do not think I have 10 minutes' worth, so I hope I am not obliged to talk that long.

My area, obviously, is demographics. That is what I want to talk about. I am happy to be here because I do not think that the connection between demographics and transportation has been as well recognized as it should be, so I appreciate this opportunity.

My remarks this morning come from two publications that I have been involved with over the last few years. One is "Demographic Change and Worktrip Travel Trends" that was sponsored by the Urban Mass Transit Administration, and the second entitled "America in the 21st Century, Its Infrastructure Needs," sponsored by the Ford Foundation. I have forwarded copies of those to the committee.

Senator MOYNIHAN. Yes, and we appreciate that.

Mr. O'HARE. The infrastructure of roads and highways and the shape of our transportation system is driven by a number of demographic trends, including the migration from the Northeast and Midwest to the Sun Belt States in the South and the West, the suburbanization of population and jobs, the increased labor force participation of women which requires transportation between home and work, and the changing age structure which has brought a whole bunch of us Baby Boomers into the driving age population.

Clearly, the movement from the Northeast and Midwest to the Sun Belt States requires new roads and streets and transportation systems in those areas that people are moving to, and it puts stress and strain on many of the places that are left behind where the streets may be underused or more problematically cities have a difficult time raising the taxes to maintain streets, much less expand streets and roads and transportation systems.

So this movement across the country has put some strains on both ends of the migration.

Senator MOYNIHAN. Would you care to volunteer a thought on a speculation which I indulged 30 years ago that the Interstate Highway Program, because of the way it was financed, would move population out of that parallelogram—roughly from Boston to Minneapolis down to St. Louis over to Washington and back up—would move them out to Las Vegas. Has it had that shift, do you think; or was that happening anyway?

Mr. O'HARE. It was happening before the interstate system got well under way, but it probably did not hurt to have that easy transportation system to make that movement.

The other pattern I mentioned is the suburbanization of people and jobs. I think that has been the most dominant pattern of the eighties in terms of people moving from central cities—many times central cities in the Northeast and Midwest to the suburbs of the

Sun Belt States, and jobs emerging in those areas as well which changes the whole nature of the commute to work in many places as well as the commute to shopping centers.

The development of the suburban communities that typically have very low density relative to central cities has changed the ability of traditional mass transit systems to work in those kinds of areas. So if mass transit is going to be a viable mode in the future, I think there needs to be some more innovative ways of going about that such as Doctor Deakin is talking about—some of these experiments that are under way need to be looked at very closely if we are going to be able to apply mass transit kinds of solutions to this suburbanization of population.

Senator MOYNIHAN. I wish, if I can just interject, that more people would attend to the experience here in Washington. We seem to be doing very well. Downtown Washington is a suburb for heaven's sake, and it gets more so as it goes out, but we have a subway. We keep adding to it.

Mr. O'HARE. At the same time you have got near gridlock at some of the places out at Tysons Corner.

Senator MOYNIHAN. That is a pattern. You very rarely see anything serious in the way of congestion in downtown Washington, but you get to the shopping malls and you run into it. They don't have a subway there.

Mr. O'HARE. The other point I want to talk about here, I guess, is my concern that I know the Chairman shares, about the impact of the suburbanization of jobs in particular on low income minorities in central cities, particularly those without cars. Our research from the 1980 Census showed that about 40 percent of black families in central cities had no vehicle available. I think as jobs continue to suburbanize, the movement between those low income minorities in central cities and the jobs in the suburbs is an issue that I think is going to be more and more problematic not only for the residents of the central city, but in many cases for those business owners in the suburbs who are looking for labor supply and find they it hard to find are raising their payment to try and attract workers.

So that is one aspect that I think is important as we think about the transportation system in the 1990's and beyond.

Also, another aspect of this that I think bears mentioning. If you look at the 1990 Census data that just came out in the last few weeks and looked at what happened to the large cities that had black population majorities in 1980, all of them except one—Inglewood, CA, which is hardly a prototypical large black city—all of them declined in population. Many of them declined precipitously in population between 1980 and 1990. The kind of stress that puts on their local tax base to try and maintain transportation systems, much less expand them, is probably obvious.

So that is kind of a double whammy there for minorities in many places.

Another aspect that I am not sure has been fully recognized by the public in terms of the stress it puts on transportation systems is the increased movement of women into the labor force, particularly the rise of dual earner families and single parents, single women, unmarried women who are supporting a family by themselves. Those women typically have to shoulder the child care responsibilities, most times the homemaking responsibilities, as well as work responsibilities; trying to fulfill all those things in the absence of a car or a good transportation systems adds even more stress to an already normally stressful situation. As everyone probably is aware, there has been a rapid increase in the percent of women with young children who are in the labor force. I think that will probably continue to increase, although it may be one of these S-shaped curves everybody talks about.

Another set of demographic changes that has had some impact and we need to think about in the future is the shifting age structure of the population. One of the reasons that we have had so many new drivers in the sixties and seventies and many new vehicles is because of new drivers as the Baby Boom population moved into their driving ages.

In the nineties we will have a little bit of a chance to catch our breath in that trend because the birth dearth of 1970's will mean that we will not have that big of an increase in the driving age population in the nineties as we have had in the last couple of decades.

On the other hand, there is some data I have seen that suggest that many more of these young people, particularly teenagers, will have a car that people of my generation did not have. So you have smaller numbers, but you have more of them driving cars. I am not sure how that counterbalance is going to work.

On the other end you have got a concern about the older population, the retired population, 65 plus, and typically they have been higher than average transit users in the past; but I am not sure that that is going to be evident in the future because I think many of those—back up. Disproportionately, the older population are made up of females; and as those older women today were socialized 50, 60 or 70 years ago, many of them did not get a driver's license or did not drive or did not drive much. I think that is certainly changing, and I am not sure that the elder population of the year 2010 when the Baby Boom population starts to retire will have the same kind of transportation or transit use patterns as we have seen in the past.

I think we have also got a window of opportunity here in the nineties because the birth dearth of the 1930's are the people who are going to be retiring in the 1990's and there is going to be a less movement into that elderly population category in the next 10 years than we have had in the last 10 or 20 years on a yearly basis. So there may be a window of opportunity there to plan for the year 2010.

I think the trends that are outlined there are basically ones that suggest that we are going to be increasingly auto based in our transportation system as opposed to mass transit. But the constraints of cost and environment and some of the other constraints that have been raised here make that a more and more difficult situation.

My major concern, is these urban patterns that we have seen over the last several decades. The longer those patterns persist, the more difficult it will be to adopt methods other than automobile based transportation systems because of the widespread—particularly the widespread, less dense suburban nature of development.

That is all I have to say.

Senator **Moynihan**. Thank you very much, Doctor. We will get back to those things.

Now Alan Pisarski who has just completed a study of commuting in America. We are beginning to hear what we heard a long time ago from John Kain and others that we are going to have to learn to live with the automobile. The densities are now such that there is no alternative.

Sir, we welcome you.

STATEMENT OF ALAN PISARSKI, CONSULTANT, AND AUTHOR OF "COMMUTING IN AMERICA"

Mr. **Pisarski**. Thank you, Mr. Chairman, and thank you members of the committee. I am delighted to be here addressing a subject that I think is quite important, and that is the demographic relationships to transportation and to travel demand.

A number of years ago I was asked by 10 of the major public interest associations to undertake a study of American commuting. They recognized that American commuting had changed but they were not quite sure what it had changed to and, therefore, they asked me to look into that. That produced a document called "Commuting in America," which some of you may have seen in the past.

Basically what that document laid out in terms of the demographics of commuting were three major factors. The first was the rather dramatic increase in the number of workers in the U.S. population. This was the result of the prodigious involvement of the Baby Boomers coming into the work force and of women joining the labor force. So the American population has had shares of the population at work not before seen in the United States or in any other country in the world.

The second factor was the suburbanization of jobs and the shifting of the dominant pattern of commuting to circumferential patterns, suburb to suburb commuting, rather than the traditional suburb to center pattern.

The third factor was the complete automobilization of those patterns, the decline of all alternatives to the automobile.

Today I am going to be addressing the topic of what the 1990 Census, completed back in April, will tell us about the kinds of trends that we have seen in the 1980's? Will the trends I have just identified be ongoing? Will they still be virulent, or will they have changed?

Part of this is covered in something I recently produced called, "Travel Demand in the Nineties," which attempts to guesstimate what the Census is going to tell us when it becomes available in about a year and a half from now. Some of the graphics in that document may be of help as I try to summarize what's happening.

The data that I am going to be presenting is based on where we were when the Census was taken back in April. Roughly speaking, from 1980 to 1990, we had increased in population about 10 percent. Population is not a major factor anymore in commuting; we are talking about less than 1 percent increase in population per year.

Workers in this 10-year period were up 25 percent. Basically we added 25 million workers to the work force. Workers have a peculiar habit of twice a day turning into commuters. It is that group, that dramatic increase, that caused a lot of the congestion and concern that we had.

If we look at some of the alternatives to the automobile, we find that those continued to decline with the result that commuters outside the home were up more than 27 or 28 percent. If we hold transit constant at about five to six million users, about where it was in 1980, we will find that auto commuters were up about 30 or 35 percent from 1980.

If we look at vehicles in use, we will find that we probably have about 100 million vehicles being used daily in the National commuting system. The decline in carpooling that we have seen around the country based on anecdotal evidence and some evidence from Census——

Senator MOYNIHAN. Decline in carpooling?

Mr. PISARSKI. Rather dramatic decline in carpooling.

Senator MOYNIHAN. Dramatic?

Mr. PISARSKI. Absolutely dramatic. Suggests that we have had probably a 50 percent increase in single occupant commuting in 10 years.

Senator MOYNIHAN. I see Senator Lieberman sort of wondering, too. You could have got the other impression.

Mr. PISARSKI. I would be delighted to be wrong, Senator; but my feeling is that this is what is going to happen when we see the Census data.

To summarize what has happened is population went up 10 percent, workers went up 25 percent, commuting went up 27 or 28 percent, auto commuting went up 30 to 35 percent, vehicles in use went up 40 to 42 percent, and single occupant vehicle use went up 50 percent.

One of the patterns that this has shown up around the country is that this is not just a characteristic of high growth cities. Looking at high and low growth cities—Buffalo, for example, one of the cities that was stable or losing population, still had very significant increases in suburban jobs, had very significant increases in suburban commuting, and very significant increases in suburban automobile commuting. This is true of Pittsburgh, of Cleveland, many of the cities that declined in their centers.

Clearly, for the areas in the West which were growing, the pattern was even further exacerbated.

Senator MOYNIHAN. There is also, is there not—you can tell the committee otherwise—there is a pattern of residential segregation that is emerging in central cities that is new to our experience altogether, is it not—an event to the last 30 years?

Mr. PISARSKI. I think there is a set of patterns that I have been reluctant to get into because the data are very hard to work with. One of the things that I have seen is that the shift in jobs to the suburbs has been tending to move to the rich suburbs. If you think of Washington, D.C., the jobs have tended to move in a northwestern direction out to Rockville, out to the wealthier areas; and that seems to be the pattern throughout the country. Whether it is because businessmen bring their jobs out closer to their homes, or whether they go to those areas to try to attract the high priced workers, the workers whose skills they need to attract for their businesses. Whatever that pattern is, it certainly tends to, I think, be followed around the country and that does add to the trip lengths and the problems of commuting as Dr. O'Hare mentioned earlier for lower income populations trying to get to those areas.

So I think we are seeing a very close relationship between incomes and——

Senator MOYNIHAN. I don't think you can go to any major city in the country—let's just stay here in Washington which is sort of politically neutral. You move out five miles from the Washington Monument and you begin to run into extraordinary office building complexes. Not factories, office buildings.

Mr. PISARSKI. You mentioned before that things are fairly reasonable in downtown D.C., and the fact is that total jobs in D.C. have been constant since about 1980. So there has been no change here in the center. All the job growth, as in most other cases around the country, is about two-thirds of the job growth is going to our suburban areas and that is where the problems tend to be.

Senator MOYNIHAN. Did we price that in some way?

Mr. PISARSKI. I hate to say. We have been talking about pricing, and I think one of the things you accomplish with pricing is you tend to drive people to places where the prices are less expensive. I think that through pricing and congestion we have pushed people farther away and are continuing to do so as businesses search for capacity.

Senator MOYNIHAN. We are looking to hear what we have been doing wrong. Remember that. Or what we might do right.

Mr. PISARSKI. Let me say that to move on to where we are going to be in the coming decade, I think the forces that I have been describing have been rather extreme ones, really rather extraordinary. I think that the forces driving them are changing, and I expect to see a softening of most of these trends—particularly the demographic drivers—in the nineties. I characterize this as something of a bubble, that we have had a rather dramatic bubble of commuting increase in the late seventies and early eighties and we are on the downside of that bubble at this time. We are kind of looking back at it. I think it would be a great mistake to project into the future what we have been through.

Let me identify some of the trends in that. The first is that the boom in workers is over.

Senator MOYNIHAN. Was that a one-time addition of the proportion of female workers?

Mr. PISARSKI. That is one of the aspects of it. The other is the fade in the Baby Boomers. The Baby Boomers are now all in the labor force, so the boom in new workers is about over. We have been adding two and one-half million workers per year since the mid-seventies. We are now down to about less than a million per year. This year we have added absolutely zero as a result of the recession. But, in fact, before the recession we had very little increase in demographic terms.

The key to this, Senator, is that in the age groups 18 to 24 we have had a 12 percent decline in that age segment in our population. There are only four States that have more 18 to 24 year-olds than they did in 1980. Nevada is one of them. Florida is another. Alaska. Nevada, Florida, Alaska, and Arizona I believe are the only four States with more 18 to 24 year-olds than they had in 1980.

Those are the new buyers of automobiles. Those are the new driver's license holders. Those are the new truck drivers. Those are the new entrants into the labor force. I think that is going to be a major factor in our commuting, but it is also going to be a major factor in other effects in the economy.

If we were adding the labor force at the rate we had been in the past, our unemployment rate today would be closer to 8 or 9 percent.

Some of the other patterns I think are also ameliorating. The shift to the automobile for commuting is about complete. The alternative to the automobile—working at home, walking to work, and mass transit—I think have reached pretty much their base levels. We are going to be looking at 86 or 87 percent of all commuting coming from automobile travel in the 1990 Census. I don't think we are going to see further dramatic shifts to the automobile because there is not a lot of dramatic shifting left to occur. We may even see some upturn in working at home in absolute numbers, but probably not in percentage terms.

Possession of driver's licenses have saturated in this society. So we are not going to see major additions to driver's licenses. Automobile ownership is effectively saturated. We have one and a half vehicles for every worker in the country.

Senator MOYNIHAN. We have one and a half vehicles for every worker.

Mr. PISARSKI. Each worker can go to work and leave that half vehicle home for someone else to play with.

Senator MOYNIHAN. And that is with the labor force participation of females at about 45 percent?

Mr. PISARSKI. That's right. With a population—very close to 50 percent of which is employed. In all of these things, I think, we are beginning to see the flattening out of all of the curves that just mangled us in the late seventies and early eighties. The drop in household sizes is of the same order. We are going to see that tending to flatten out.

The surge to the South and the West seems to also be softening, softening from its incredible levels of 91 percent of the population change in the early eighties going to the South and the West; 50 percent of population increase going to California, Texas, and Florida; 18 percent going to the four urban areas of California. We are beginning to see that softening. It has dropped off to about 80 percent, which is still not exactly soft, but it does indicate that there is that kind of decline.

The shift to the suburbs continues, but it is not going to shock us as much as it has because we are not adding numbers in the amounts that can have the kind of prodigious effects on suburbanization that we saw in the seventies and eighties. We will shift from maybe 45 percent of the population in suburban areas to about 48 percent by the end of the century. I don't think that is going to drive——

Senator **Moynihan**. Say that again, sir.

Mr. **Pisarski**. We will shift from about 45 percent of the U.S. population being in suburban areas to about 48 percent by the end of the century which suggests that about half of the members of the United States Congress will come from suburban areas.

The suburbanization trends will continue and some of the shifts to the South and the West will continue, but I don't think they are going to have the kind of virulence that we have seen in the past. One of the reasons for that certainly is the fact that the 18 to 24-year-olds who are the people who tend to move, who are the young starters out who shift to the South and the West for new job opportunities are just not going to be there in the numbers to cause these kind of shifts.

Senator **Moynihan**. Can I make a point to my friend, Senator Lieberman. Mr. Pisarski's testimony on demographic trends—there is a saying adapted from Freud that demography is destiny. It is one of the few things that you can know.

Mr. **Pisarski**. I remember you saying that many years ago, Senator, and I did not forget it.

Senator **Moynihan**. I can tell you how many people—or I could find out within the course of the afternoon—how many kids are going to show up for kindergarten five years from now or six years from now because they have been born. It is one of the few things you know. You don't know much else. That Baby Boom of ours which may have something to do with our transportation policies.

We use the term—this is something that Jim Coleman and I worked on when we were members of PSAC. We used the age group 16 to 24. Demographers sometimes refer to them as the barbarians. They are the people who invade your society. The question is what is the proportion of defenders against attackers. They invade barbarian society. Nobody is born being a barbarian; you have to be taught to be a barbarian. There are enough barbarians around to teach you to be a good barbarian.

Between 1890 and 1960 the size of that cohort grew by about 11 million persons; it grew about a million persons a decade, million and a half a decade. Then in the one decade of the 1960's it increased by 12 million, as much as the whole previous 70 years. In the 1970's it went back to its historic, about 1.2, and in the 1980's it declined.

That wave just crashed through every institution in your society, overwhelmed them all. They were all radicals in the sixties, political radicals. There is something to be said for political science, and we were able to say in 1970, no, no, there isn't going to be a politically radical generation. Much too large. Very shortly now discover that the 1960's was a good time of locking up the dean.

By the 1980's the question was going to be who would become dean, and you would find there were 14 candidates. I made the suggestion that if you would like to know what the 1980's is like, read Flaubert. You get one opportunity in life. If it doesn't work, you hope your son will do better. Just size of cohort limits, opportunity which makes for a certain narrowness or something like that.

Anyway, it is a big change and it is just about over, isn't it?

Mr. Pisarski. That's right. I think basically the same people who competed for kindergarten space and grammar school space in the fifties competed for high schools in the sixties and college in the sixties and seventies, are the people who are competing for road space today. I think the point is that that bubble, that we are looking at kind of a downside of that——

Senator Moynihan. Don't think that this competition will be endless, go on indefinitely. Look up to find that nobody is talking about getting new licenses in the next decade.

Mr. Pisarski. That's right. Basically we are now saturated out in the license area. Basically I think that 2010 is the trip point where American demography changes when the Baby Boom gets to 65. That's really the kind of tipping point.

Anyway, the conclusions that I draw from this is that it would be a serious error for us not to recognize the fact that we have been through this bubble and to base current public or private policies on the continuation of these extreme trends that we saw back in the eighties. It certainly leaves us in a post-bubble era with a lot of problems that we do have to address and a lot of problems that we have been left with because we didn't address them. But I think it also says that our problems in the future may well be more tractable than we might think otherwise.

Senator Moynihan. I thank you for that and let's keep with it. I don't want to seem to pedantic, but there is a pattern here of not noticing demography. When those kids hit the kindergartens, everyone said, my God, there's suddenly all these people arriving in kindergarten; how did that happen? Well, you know, they were born five years ago; you could have thought about that a little bit. When they got to high school, college.

The universities had a very interesting reaction. In 1970 they concluded that campuses would be in turmoil indefinitely. So they all got lawyers for presidents who would know when to call the cops. If I may say, in the public interest in 1973 I had an article which had been a lecture at Phillips Exeter. It was called Peace. I said no, it's all over; they've gone through. People blinked at you and said what are you talking about. And it was over.

Now this same group enters the population of purchasing automobiles and locating a family, having American mobility decide where you want to live. Well, that may have happened. If we just think that what we went through we will continue to—it's that same Baby Boom. At every stage that it is arrived at a particular institution, the institutions have concluded that that will be their permanent condition when, in fact, very much abnormal.

The origins I think were, first of all, the drop in birth rates in the Depression. That was followed by the second World War and was accompanied by improvements in public health that made for improvements in fertility such as you had about 10 years there from 1945 to 1955 that you could never replicate; you could never do that again. Isn't that about right?

Mr. Pisarski. That's right. I am from that Depression baby set, and I am about the smallest cohort in the Nation I think.

Senator Moynihan. That's why you look so successful and in demand.

Mr. Pisarski. I was one of those people that got wheeled through the New York World's Fair by my mother in a baby carriage in Flushing Meadow.

Senator Moynihan. Thank you very much, sir.

Mr. Pisarski. My pleasure.

Senator Moynihan. And now to conclude our proper witnesses, we turn to you, Mr. Johnston. And we are going to continue on the subject of demographics from a social scientist point of view. Doctor Johnston is with the Hudson Institute which somehow has moved to the banks of the Potomac.

STATEMENT OF WILLIAM B. JOHNSTON, THE HUDSON INSTITUTE, ALEXANDRIA, VIRGINIA

Mr. Johnston. It is actually the banks of the White River in Indianapolis, its headquarters, from which I bring you, Mr. Chairman, greetings of our new president, Les Lenkowski, who has now taken over.

Senator Moynihan. Indeed, sir.

Mr. Johnston. I would like to extend a few of the remarks made earlier and draw a couple of conclusions from the demographics and the general trends for transportation. While I agree with some of the things that have been said, I am concerned that we may draw some wrong conclusions.

There are certainly some of these trends which are asymptotes that are going to taper off, but there are a couple of basics, I think, that have gone on in the demographic and economic trends that are certainly not going away. I will point to the two most important ones.

One is the dispersion phenomenon which we have been talking about which is both suburbanization, and the growth of cities that were created after the automobile was invented. That simple movement is shifting people to cities which are inherently less dense because they were developed after the multi-point highway based transportation system was dominant.

Another type of dispersion which is occurring and will continue, is what I will call the resort pattern of development which is partly real resorts and partly the phenomenon of office jobs moving further and further away to more and more campus-like settings. This is taking place in part to be near the home or the second home of the CEO, but also for other reasons as well such as the amenities available, and the work force available.

So this trend toward dispersion is quite powerful. I don't think it was driven primarily by the interstate highway system. If I were to point to two factors that I think are most responsible and quite likely to continue, they would be: first, the uneven impact of Federal spending around the country. This is a subject that you have discussed before, but it is quite powerful. If you look at Social Security and defense spending, that money flows much more to the South and the West and that creates a self-reinforcing pattern of growth which is not likely to change unless people's preferences for where they want to live or the location of defense contractors changes in fundamental ways.

Senator Moynihan. You could make it fashionable to be cold.

Mr. **JOHNSTON**. I would suggest you have more prospect of putting a dome over enormous segments of cities. I only half facetiously suggest that. One of the largest malls in North America is in Edmonton, Canada, where most of the space is, indeed, under a dome and it draws people from all over Canada and, indeed, the United States to that retailing environment.

The other thing I would point to in terms of long-term demographics is the impact of immigration. Immigrants are some 40 percent of the net growth projected by the Census Bureau in our population in the nineties and beyond.

Senator **MOYNIHAN**. Forty percent.

Mr. **JOHNSTON**. Forty-two, I think.

Senator **MOYNIHAN**. Getting on to half the population.

Mr. **JOHNSTON**. Of the net growth. The growth that results from immigrants coming in and from the children of immigrants then being born in the United States.

Senator **MOYNIHAN**. So it's first and second generations.

Mr. **JOHNSTON**. Yes. So population patterns are greatly affected by immigrants who settle unevenly around the country near friends and family. That has overwhelmingly been in the South and the West in recent years, likely to be so——

Senator **MOYNIHAN**. Been more than we thought in New York City.

Mr. **JOHNSTON**. Yes, with some significant urban exceptions of which New York City is one. To the extent we get lots of new immigration from Eastern Europe, potentially from the Soviet Union, that may tend to change the balance a bit increasing the population of New York. But immigration is a big driver of the regional pattern of dispersion.

If I were to draw one overall conclusion for transportation, it is that the trend toward more dispersed, lower density cities will continue. So over the long term, aggregating trips, however you want to try it—carpools, transit, whatever strategy you might use—is increasingly difficult. The origins and destinations are increasingly dispersed. So we fundamentally have a highway-automobile-truck-based system which is going to become more so, driven by the demographics.

The second point about the demographics, and here it blends a bit into the economics:: our society has become increasingly hurried. In part this is the result of women entering the work force. That is, the time pressures on two earner families or single earner female headed families are intense. There are other factors in the economy that are accelerating all kinds of economic processes, but the time pressures that individuals feel have made time of greater importance. Partly it is just that we pay people more in absolute terms for everything, but it is also that we have created a circumstance in which most of the two-earner families have what you might characterize as enough money but not enough time. The thing they value the most is free time. If they survey them, you find that they perceive their free time to be declining.

I want to make the general point about the importance of time because I think it bears on what kind of transportation system we want and will tolerate. It is not an accident that congestion has become more of an issue, not merely because of the demographic bubble, but also because of the pressures that people feel to accelerate everything in their lives means that every wasted minute costs more. We feel that it costs more to waste time with a UPS delivery, more to waste time in traffic. We are more concerned over how long it takes to get to the beach, more concerned with whether or not you can make the meetings on time or be here at exactly 10:00 o'clock when the meetings begin.

In terms of transportation, we appear to have been on a very long flat spot in terms of the overall speed of that system. Since the superhighway and the jet plane were developed, we have really not accelerated point-to-point travel times. Indeed, in many cases they have gone down apparently.

Senator MOYNIHAN. Now, there is an S curve there.

Mr. JOHNSTON. I am sure there is an S curve someplace out there, but I don't think we are anywhere close to it. I mean, the ideal transportation system is an instantaneous magic carpet. But we could still——

Senator MOYNIHAN. It wouldn't be significantly better than a 747. Ox cart?

Mr. JOHNSTON. The problem is we have thought of the 747 as being the segment once you are in the air, but it turns out that all of the travel time is getting in and out of the airport, in and out of the airplane, back downtown to your destination. These travel times have not declined.

So the point here is that speed has become more important and, yet, our transportation system has not kept up with this growing demand that society has for ever more speed in its point-to-point travel times.

What does that suggest to me about our transportation system? It is going to be automobile and truck based, and it ought to work faster than it has historically. How do we go about getting there? Well, the single point that I would like to raise—and I certainly endorse a number of the points that have been recommended in terms of using pricing rather than congestion as the way to make the system more efficient—the one thing we lack today is data about the performance of the system.

We know all about miles of highway; we know about the number of railcars, the number of people that get on airplanes. But we have little of the kinds of data about transportation as it is perceived by shippers or travelers: How long is it taking us to get to work? How long is it taking a UPS driver to make his deliveries? How many stops can that driver make in a day? What is the cost and performance of our system and particularly this performance as it relates to time? We know very little.

Mr. Chairman, you have been one of the users and developers of data in areas relating to poverty, relating to health care, relating to the labor force, but data is the poor relation in transportation, where we make these multi billion dollar developments and investments without really understanding how they are going to affect the performance of the system.

We need to be systematically, repeatedly measuring what we accomplish with these investments and measuring it in terms of how shippers and travelers perceive it. Have we shortened travel times?

Have we reduced the costs? Have we changed the basic performance of the system?

So if there is one plea I could make to the committee in the reauthorization of the bill, it is that we need the underpinnings of information, that we not be coming back to a periodic hearing where a bit of data is assembled but that there is an ongoing data collection process, performance data driving investment decisionmaking for the system.

Senator MOYNIHAN. This is not routinely done at Federal highways?

Mr. JOHNSTON. No. We collect a vast amount of data. I don't want to leave the misimpression that we don't have data.

Senator MOYNIHAN. But it's not very analytic data.

Mr. JOHNSTON. But it doesn't tell us what we ought to do. We know how many miles of highway there are. We know the condition of the highway, but we don't know how one billion here versus one billion there might change travel times or freight costs or any of the economic variables. We collect some data and we do periodically some surveying, but the area we do not really know much about is how travelers and shippers perceive the system. All the data is collected by suppliers of the services—by the State and local highway departments, by people that think they are answering the need but don't really have data on what the needs are.

Senator MOYNIHAN. To your point, and a fascinating one—it has all been fascinating. One of the things that, quite independent of government but using obviously government facilities, in the 1980's we saw three large events. We saw the fax machine appear on its own. It took 19 weeks or something like that. I know one day there wasn't one and the next day all you got in the office was these things. We saw the cellular telephone. One day there wasn't one, one day Dick Tracy had it and the next day everybody had it. Then we saw overnight delivery of packages. Federal Express. There was a dissertation written at Harvard Business School that you could do it. Give it to us by 10:00 in the morning and be back at 10:00 the next morning. And now United Parcel Service. The transportation system is capable of something that the post office long ago gave up.

Thank you very much, sir.

Senator MOYNIHAN. Senator Lieberman, you haven't had a chance to say a word.

Senator LIEBERMAN. Well, Mr. Chairman, I have been engaged not only by the witnesses but by you. This is the second of this series of hearings and they have been very thoughtful and thought provoking.

Let me start on this point. We went through the Clean Air Act experience in the last session. One of the points that kept coming home to us, or should have anyway, is that no matter how much we were able to force technology to clean up cars, for instance, as a major source of air pollution, that the number of cars on the road by the projections we were hearing at that time would go up and up and up. The vehicle miles traveled would continue to go up so that ultimately even if we made the cars cleaner, we might not make the air cleaner because there would be more cars out there polluting.

I just happened to have been in a discussion yesterday with some people who were particularly concerned about the environment, and they were telling me that they had done some public opinion polling on various environmental problems and people's receptivity to change, to changing their ways—recycling, even industrial pollution, land use. There is a tremendous degree of positive response, willingness to do something about it until you get to asking people to drive their cars less or to carpool or to—this is a report that this fellow gave me on the poll—or to use mass transit much more.

In the Clean Air Act we tried, as you, Doctor Deakin, mentioned, to put in some transportation control measures. I kept saying last year that we ought to figure out a more appealing way to describe that than to call them transportation control measures.

Senator **Moynihan**. Incentives.

Senator **Lieberman**. Right. But including some attempt, going back to what Doctor Kain said, a very modest attempt, may I say, to encourage larger employers to improve the riders per car of their employee work force.

My question is really to any of you. Clearly, as we considered one of the themes that came out on Tuesday and again today was that the Interstate Highway Program has determined land use, has determined work patterns. But to some extent aren't we still dealing whatever the cause—maybe you could offer a suggestion—with the romance, this very powerful relationship between us and our cars and our reluctance to yield. I invite you to discuss it, to relate it to some of the demographic trends we are talking about and to suggest if you would what we might do about it because it seemed to me at least going through the Clean Air Act experience that it is so strong a force that it may override some of these other trends that we are talking about, some of which are reflected in some of the numbers that you have given us about the increase in vehicles out there.

Doctor Kain, do you want to start?

Mr. **Kain**. Well, I might say something about the romance. I have a number of friends who are in love with cars. In general, however, the American public responds very rationally to the opportunities that are available to them. For most urban trips, given the way the world works today, the automobile is just better; in particularly, it is faster than transit for most trips. What people value is time, as one of the other speakers had indicated.

Senator **Lieberman**. So what you are saying is that it is not that we have some mysterious affection for the automobile; it is that it is right now the best, the most appealing way to get to work or to get to the shopping center.

Mr. **Kain**. That's right. There is very abundant empirical evidence that indicate that people make complete rational choices when they decide whether to drive or to use transit. Where transit is relatively fast, frequent and convenient and where private autos are expensive to use, particularly where users have to pay for parking, significant numbers of tripmakers will choose to use transit or carpool. Tripmakers respond rationally to relative prices and relative travel times. Our task is to make sure that tripmakers are confronted by prices that reflect the social costs of providing these services. In this respect, we should mimic the private sector. The private sector generally charges prices that reflect the cost of producing services. In general, charging prices that reflect production costs leads to an efficient use of resources.

In the public sector, particularly in the case of highways and public transit provision, we do not charge appropriate prices. Governments either charge nothing for these costly facilities or they charge prices which do not reflect the cost of producing the services. As a result, consumers systematically make choices that are not in society's best interests. The reason we have serious and possibly worsening congestion is that we don't charge properly for the roads. Since appropriate monetary charges are not used, congestion becomes the allocation device. Unfortunately, use of congestion to allocating rural space results in enormous waste. Serious congestion signals market failure; it is an indication of the extent of market failure.

Senator LIEBERMAN. Let me just for a moment pursue the parking subsidy question. I was struck and I guess I was also pleased that you focused on it as much because it was a concern of mine personally as we went through the Clean Air Act last year. It is very tough in this setting because people do cling to the parking subsidy. They may not be wed to their cars, but they are wed to the subsidy. To bring about change and really the change that we are requiring as part of the State implementation plans, only in the worst, that is, the most air polluted areas, is a modest one.

I am wondering if in your work and your focus on this you have any creative ideas that we might consider including somehow within this Surface Transportation?

Mr. KAIN. This committee presumably understands much better than I do why it is that, with the impressive general effort to remove loopholes during the last 10 years, this particular one, which has such deleterious effects, has been such a sacred cow?

I simply don't know the answer. There are approaches to eliminating the subsidy. What is important is that the legislation/regulations are changed, that the user, the vehicle operator, pays the price for the parking he or she uses. One approach would be to require employers to offer some kind of in lieu payment that is equal to the subsidy to employees who do not use employer-provided parking. Employees should be given the choice of the subsidy (employer-provided parking) or an equivalent amount of money. Both of them ought to be treated equally and presumably be treated as taxable income.

Senator LIEBERMAN. Which they might then use for mass transit.

Mr. KAIN. Or anything they like.

Senator MOYNIHAN. I can say to you that this comes up in finance all the time. I can't remember why we never can do it, but we never can.

Mr. KAIN. The continued exemption of these subsidies from taxation is really quite remarkable. In recent years, there has been an impressive and generally successful effort to close these loopholes. During this period any number of deserving employer fringes have been made taxable. Parking subsidies are treated in a very peculiar and different way than, say, transit subsidies. If an employer pays more than $15 towards transit, it becomes taxable under current law/regulations. Yet, parking subsidies of much greater magnitude are tax free.

Senator MOYNIHAN. We have tried to make that a non- taxable item if you provide funds for—give you subway fare. We do fairly well on that, we could do more.

But the other thing is—one of those things that won't happen.

Mr. KAIN. Even so, eliminating the tax exemption for employer-provided parking would have a major positive impact.

Senator MOYNIHAN. We should pay more attention to it. We have thought of it as kind of a revenue thing and not as a transportation policy, you see.

Mr. PISARSKI. Let me respond a little there, Senator. I think that the issue may be a little tougher to deal with than we are recognizing here. It is not a question of whether we have the authority or the power to do it; but I think the history of the game that I have described to you for the last 20 years is the history of our trying to constrict people's behavior and squeeze them and make them behave in the ways that we think they ought to behave. Surprisingly enough, they have their own notions of how they choose to behave, and they have squeezed out from under us and gone and done what they chose to do. We drive them out of city centers to the suburbs to the periphery where the parking is free and where the travel times are good. I think continuing to squeeze them will simply further accomplish that. I don't think the public will behave in the ways that we expect them to or the ways we would have them do.

Mr. JOHNSTON. If I could just reinforce that point. It is as though we have our teenage daughter going out with this derelict automobile driver and we wish we could get her to ride transit. We have been systematically trying to adjust public policy to encourage that, but the demographics and the preference is so overwhelming for this point-to-point system that goes when we want to go when we want to go as long as the road isn't too darn full.

I mean, most of the motivation for transit investments is so all the other guys will get off the road so we can drive straight to work.

Senator LIEBERMAN. So you're saying that is going to be hard to compete with?

Mr. JOHNSTON. I am saying—I guess I would draw an even more absolute point. I think Alan's data are simply overwhelming. We will never, with any level of subsidy—and I agree we should have proper pricing of the automobile—but we will never with full pricing of the automobile and deep subsidies for transit get any significant aggregation of trips into either carpools or transit. What we need to address are the obvious environmental and other problems created by automobiles. We may want to put more highways underground; we may be trying to make roads look better; we may invest more in making cars quieter. Right now we have let cars and trucks be as noisy as they want to be and we put up noise barriers to no particular effect in most places.

There are a lot of things I think we can do to fully price and minimize the downsides of automobiles, but getting people out of cars is not going to solve the problem.

Senator **Moynihan**. I think we could put that down as the Johnston's Rule that there is no necking on subways.

Mr. **Pisarski**. I think it is a very important point, Senator, that we are trying to recognize here. I think the answers are going to lie in making the automobile a good neighbor and making it a more responsible citizen in terms of it being more benign in its consumption of fuel and its generation of environmental problems rather than expecting that the world will give up on its use.

Senator **Lieberman**. Yes. Hard to duplicate in other forms of transportation.

Mr. **Pisarski**. Doctor J. Douglas Carroll, who was the Chairman of the Tri-State Transportation Commission in New York, many years ago when I started out in the business said people buy automobiles in order to use them, and the notion that it was some kind of a love affair, I think, is very misleading. The automobile is just a very effective and very useful object.

Senator **Moynihan**. Yet, if I could interrupt, Senator, just to say that the good Doctor Deakin had her hand up. Would I be wrong in thinking that the politics of Southern California are increasingly concentrated on what do you do about all these automobiles; isn't that right?

Ms. **Deakin**. I would like to say a couple of words about the California experience with air pollution control. Because of State law we are a couple of years ahead on planning that is very similar to what will be required of many areas under the Federal law.

The analyses that have been done in the Bay Area have the advantage of having very detailed travel surveys that have been conducted every 10 years—one in 1965, an update in 1975, another one in 1981, and then another one just this past year. So we have very good time series home interview survey data based on trip diaries from households. We know every trip that the household made during the day, when and where the trip started, what mode of transportation was used, what the trip purpose was, and the destination of the trip. We also have demographic information about those households. That allows us to do some analyses that I think are quite revealing.

The Bay Area has one of the highest transit riderships for work trips of any of the metropolitan areas in this country. We have the BART system which, despite its critics, does work very well for many people. We have good bus services. We have high occupancy vehicle lanes. And we still find that we have severe congestion problems on highways.

We have some reason to believe that congestion and transit use go hand in hand—the higher the congestion, the higher the transit use in a particular corridor.

We also have some concerns that blanket policies about building high occupancy vehicle lanes need careful consideration. In some cases, our analyses indicate that the carpool riders are people who used to be on the bus. So the cost effectiveness of those high occupancy vehicle lanes looked at from a system perspective is not quite so high as it appears to be from a narrower facility perspective.

We also have discovered that the only way we would be able to meet the State air quality standards in the Bay Area—now, the

State standards are tougher than the Federal standards—would be if we can implement parking pricing and road pricing.

Senator MOYNIHAN. Road pricing is a nice economist term for tolls.

Ms. DEAKIN. Tolls. We would need both tolls and parking pricing in order to meet our State standards. We probably will need parking pricing to meet the Federal standards.

We thought that these proposals would be a political disaster. However, a recent poll done by the Bay Area Council, which is an organization of the top 100 CEOs in the Bay Area, found that there was a considerable support for gas tax increases and other pricing strategies that could be used to reduce air pollution, provide better transit options to people, and do something about congestion. In fact, with no public information program whatsoever so far, 49 percent said they would be willing to pay tolls on the highways. Of course, the law does not permit us to put tolls on the highways at the moment. That certainly is a limitation on the ability to address our congestion and air quality problems.

Los Angeles has taken a much more regulatory approach than the Bay Area has. The South Coast Air Quality Management District has required employers to put together trip reduction plans. They are finding that the most effective strategy in shifting modes for work trips is parking pricing.

These pricing strategies could be very effective. While I certainly don't believe the automobile is going to disappear or decline substantially people's choices reflect the prices that they are facing. If the prices are well below social cost, you can expect behavior to be somewhat anti-social.

Senator MOYNIHAN. I was handed a note just a moment ago which is sort of fascinating about the relationship between mass transit and air pollution. It turns out in the current automobiles most of the pollutants come out in the first two minutes before the catalytic converter is warmed up. So if you are just taking your car six blocks or ten blocks to the subway, you might as well drive all the way into town as far as the emission concern.

Ms. DEAKIN. That cold start is critical, at least with current catalyst technology. However, there are technological improvements coming along that will offset that somewhat, though not entirely.

One of the things that that means is that we should think twice about building rail lines into cow pastures in hopes that eventually development will follow along and create an urban environment. In the interim, perhaps 10 or 15 years, these stations have to be served by park and ride. But park and ride lots are not a terrifically good air pollution control strategy. Again, this is one of the reasons planners are looking to have explicit land use policies around transit stations. If you are going to build transit stations, then supportive land use policies will be required—after all, this is not an entirely free market system for land development, any more than it is for transportation

There is some evidence that building transit or highways does not create economic development but shifts development patterns. In many cases, however, local governments are constraining development with zoning that, for example, keeps all but upper income households out of the communities that have the suburban office parks and that restricts high density development around transit stations that transit needs and developers would indeed like to build.

Mr. KAIN. I would like to take a moment to comment on the relationship between congestion and transit use. Doctor Deakin indicated that in general transit use is higher where there is more congestion. She, implicitly, is thinking in terms of modes, rail or possibly exclusive bus-carpool lanes, where the transit vehicles are removed from congestion. The more common situation is one where congestion degrades transit performance. Most transit trips in the U.S. are made by bus on general purpose roads and streets; uncontrolled congestion has a very deleterious effect on these services. This means that policies that reduce congestion on these streets and roads will result in dramatic improvements in the transit services using these facilities. It is well to keep in mind that most of the vehicle miles of transit use these roads and streets.

It follows that pricing measures, for example, central area licensing or parking surcharges, will not only discourage private auto use and reduce congestion, but the reduced congestion will improve transit speeds and reliability, and these improvements will lead to more transit use.

I also want to say something again about the trends discovered by the other members of this panel. My paper identifies some of the trends. There is no disagreement about the critical trends in land use and socio-demographic structures. On the other hand, remember my observation that 90 percent of the urban transportation problem and congestion—which are almost the same thing—is caused by gross underpricing of 5 percent of highway capacity. This means that simply expanding capacity in response to growing automobile use will not eliminate congestion. If you do not recognize this fact and if you fail to directly attack the root cause of congestion, which is this mispricing, you can spend and spend and end up with as much waste and distortion as before.

The problem of congestion and mispricing do not go away as a result of recognizing the trends. The trends in urban development patterns, in part, are an adaptation to congestion and mispricing. One of the reasons for dispersal is the serious congestion that exists in many built-up areas.

Senator MOYNIHAN. I am sure Senator Lieberman would agree that we ought to really pursue this concept. There is a 5 percent problem here. But we have to know a lot more about where; don't you agree?

Senator LIEBERMAN. I do. I wonder if I can ask for some reaction to the points that Mr. Pisarski made, which I thought were very interesting, that we at this point involved in the consideration of the reauthorization of the highway bill should not base our judgments on the extreme worker bubble experiences of the seventies and eighties because this bubble may work its way right through the system.

I particularly want to invite Doctor O'Hare and Doctor Deakin to respond because it seems to me that some of the things that you said might run counter to that, some of the demographic trends that you were speaking of.

Mr. O'HARE. If I could respond first because Alan is certainly right about the bubble and the Baby Boom—not only in size, but the lifestyle change, the labor force participation of women. I think we have experienced unprecedented and probably won't experience the same kind of changes in the nineties and early part of the 21st century that we have experienced in the past.

On the other hand, some of the other changes like the suburbanization, the movement to the Sun Belt continue. I'm not sure what is going to happen to the labor force participation of women; it might go up higher, but it can't go up a whole lot higher.

So I think he is right about part of it that we have experienced a big bubble that we are not going to experience again. On the other hand, several of the other trends I think are going to continue, although I agree with him not in the same magnitude probably that we have had in the last decade or two.

Senator LIEBERMAN. So you would agree that the problems may be more manageable than they are now, although we shouldn't draw a direct correlation between the drop in the worker bubble and the transportation problems we are going to have because of the other factors you cite?

I was thinking the same of your number, Doctor Deakin, which I thought was powerful about how the small percentage of the trips that are work related that you found in your studies.

Ms. DEAKIN. It has, in fact, been the case for some years that work trips are a minority of trips. Even during the peak hour, it is important to note, work trips are only half the trips that are on the roads.

Senator LIEBERMAN. Even during what we would consider to be the commuter hours?

Ms. DEAKIN. Right. So when you consider that, it makes it all the more important in considering noise problems, air pollution problems, other environmental needs that we think about the vehicle and guideway technologies that are involved. We also need to think about the pattern of development because, for example, a lot of the development pattern that has been emerging is one that simply cannot be served by anything but the car.

Even carpools do not work well in many cases; the densities simply are too low, the patterns are too dispersed. Yet, the street pattern is being developed in a way that concentrates vehicle trips through very few intersections. We are using freeways as Main Street in some of these communities. There is literally no other basic transportation network to support travel except for the freeway system, and the local road systems are designed to pump cars as quickly as possible onto the freeway system.

Design factors can make a big difference. There also are some possibilities that strategic transportation investments at particular locations can make a difference. There are some small scale things like traffic signal timing that have been tremendously undervalued, but make big differences. In fact, signal timing would handle much of the congestion on the arterials, which are the workhorses of the urban transportation system and where buses are operating as well as the cars.

Mr. PISARSKI. I would like to second that. First with respect to the question of travel time distribution, I think what we are seeing in the shift to services, and the new kinds of activities we have, that we are seeing a flattening out of the peaking of travel. Congestion is having an effect as well, but there is a shifting in demand with people working in evenings, working weekends and so forth that is flattening out the peaks in the system.

We do not tend to have the factories with 5,000 people where you blow the whistle and everybody is in at 8:00 or out at 5:00. The patterns are more distributed and more dispersed. What we are seeing is that there is no single peak hour. I think when we see the 1990 data, we will see that there is no single hour where we have more than 30 percent of the commuting occurring.

So there really is not a peak hour anymore in America. There is kind of a peak period that sprinkles out over very long periods of time, and that, of course, begins to affect the other factor that other purposes begin to overlay on top of the commuting pattern.

I think any focus that says somehow if we fix commuting and if we bend the commuter in some fashion, we're going to solve our problems is a risky one. There are many, many purposes that are being served in the so-called peak hours, and the flattening out of that peak is a response to that.

I think that the final point that Doctor Deakin made with respect to the power of signalization and improving our utilization and the operation of the existing system can go a very long way.

Senator LIEBERMAN. Thank you, Mr. Chairman.

Senator MOYNIHAN. Doctor Kain.

Mr. KAIN. I just wanted to react to Mr. Pisarski's observations about the bubble and whether traffic will continue to grow at the rate is has recently. Whether the growth of traffic is going to slow down is not the issue. There are great pressures to expand highway capacity, even if no growth is anticipated. I would urge this committee to make every effort to avoid being drawn into and supporting a mindless massive highway program. There is a lot of support for the notion out there that what we need to build a lot of new roads.

Senator MOYNIHAN. I find that contractors are very interested.

Mr. KAIN. The first order of business is to begin implementing policies that recognize the 5 percent problem because it is the root of the problem. While the observations by the panelist about the growing importance of off-peak and non-work trips are correct, it would be a mistake to conclude this is a reason for reducing existing Federal subsidies (tax exemptions) for employee parking. Work trips are still a very large part of the congestion problem in dense central areas.

Still another observation I would like to make has to do with suburban activity centers. One of the reasons that there is so little congestion in downtown Washington and downtown Houston and there is very serious congestion at Tysons Corner in Washington and at the Galleria in Houston is because the road systems serving these suburban centers are hopelessly inadequate. Developers were allowed by local governments to build those enormous complexes with hopelessly inadequate transportation capacity. By contrast, downtown Washington and downtown Houston have huge amounts of highway capacity and are well served by public transit.

Developers were allowed to build these complexes up in pastures with no significant provision for either private or public transportation. Local government should be strongly encouraged to pay more attention to these problems. It would be a mistake for the Federal government to simply bail State and local governments out from their failures to plan and provide suitable infrastructure. State and local governments should again be encouraged/required to pursue pricing and other transportation policies to solve or alleviate these problems.

Senator **Moynihan**. It is my melancholy duty to report that what you can't see above you and we did not anticipate, which is that the Senate went in earlier and under our rules we would have to have unanimous consent to stay in past noon. It is past noon, but no one—I don't think we will be censured, but we will have to abide by the rules.

If we stop a little sooner than obviously we would be disposed to do, it is only to make it clear that we want to keep in touch with each of you as we write this bill. We want to write a smart bill, don't we? Make history.

Mr. **Kain**. Not a massive mindless one?

Senator **Moynihan**. Not a massive mindless one. On that note, we want to thank our panelists very much. I am sorry that Senator Durenberger did not get a chance to speak, but I thank you all.

[Whereupon, at 12:08 p.m. the subcommittee was adjourned, to reconvene at the call of the Chair.]

[Statements and other material supplied for the record follow:]

Trends in Urban Spatial Structure, Demographic Change, Auto and Transit Use, and the Role of Pricing

Statement Prepared for the United States Senate,
Committee on Environment and Public Works

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[*] Roberton C. Williams III helped prepare this statement. In addition, Don Pickrell (TSC), Philip N. Fulton (Census), Jose Gomez-Ibanez (Harvard), Samuel L. Zimmerman (UMTA), and David R. McElhaney (FHWA) provided advice and both published and unpublished materials that were of considerable value in preparing this testimony.

Trends in Urban Spatial Structure, Demographic Change, Auto and Transit Use, and the Role of Pricing

Introduction

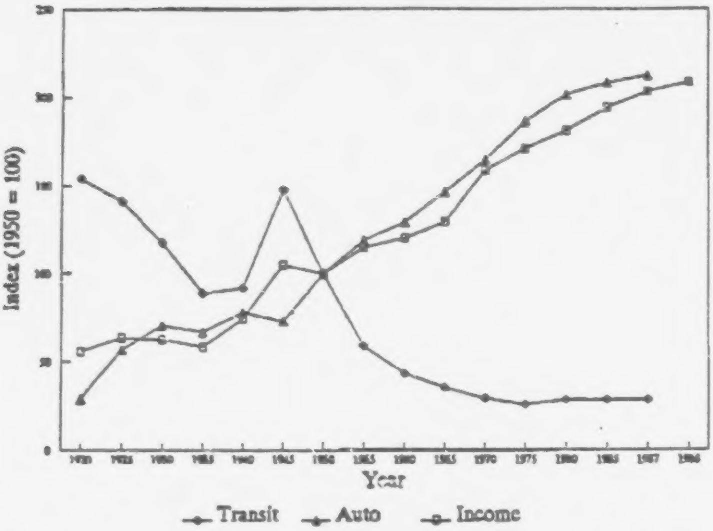
Dramatic changes have occurred during this century in the size and shape of the nation's urban areas, in the locations of jobs and residences within these areas, and in the extent and nature of urban tripmaking. For the most part these changes have been efficient responses to changes in technology and rising real per capita incomes. Still, important examples of market failure exist. In large part, these arise from the failure of governments, who are the principal providers of highways and public transport services, to charge urban tripmakers prices that reflect the long run social costs of providing these urban transportation facilities and services.

In this testimony, I begin by reviewing the major trends in urban land uses that have occurred during this century and the forces responsible for them. Then, I consider the distortions to metropolitan development that have been caused by the mispricing of urban transportation facilities and services by federal, state, and local governments. Finally, I propose a number of changes in public policy that would correct the most serious of these distortions, by inducing some urban tripmakers to shift to modes, principally carpools and transit, that are efficient users of street space. These changes in travel behavior would lead to large increases in welfare and significantly reduce the level of transport investment that would be required to achieve a given level of mobility. I begin with a discussion of the immense changes that have occurred during this century in the use of private and public transportation modes.

Trends in Auto Ownership and Transit Use

The indexes of auto ownership and transit use per capita shown in Figure 1 provide a broad description of the changes in urban transportation since 1920. The choice of 1920 as the initial year was purposeful as passenger cars and trucks, which

Figure 1. Indexes of Auto Ownership, Transit Use, and Income Per Capita, 1920–1988 (1950=100)



would transform urban development and transportation, began to appear in significant numbers at about this time. Both of the indexes in Figure 1, as well as an index of per capita GNP, which I will comment on subsequently, have a 1950 base year (1950=100). The transit index is the ratio of annual transit trips per urban population, while the auto ownership index is the ratio of passenger vehicles to total population in each of the years shown. Per capita GNP is measured in constant dollars. While not ideal, these indexes broadly describe the changes that have occurred in urban transportation during the past 70 years. I use them because they are the only consistent indicators of the extent of urban tripmaking by mode that are available for the entire period.

As the data in Figure 1 indicate with the exception of a respite during the depression, a surge during World War II surge, and a small blip in 1980, transit ridership per capita has declined steadily since 1920. As these data also reveal, passenger vehicles per capita (largely private autos) are more or less the mirror image of the indexes of per capita transit ridership. Auto ownership grew rapidly between 1920 and 1930, before the depression and World War II halted its growth. After VJ Day per capita auto ownership returned to its early rapid growth path. Per capita auto ownership grew until circa 1980, when the rate appears to have slowed somewhat. The lower rate of growth in per capita auto ownership after 1980 may be due in part to a saturation phenomena (most households owned at least one car and many owned two or more by 1980) and to a somewhat slower growth in per capita income.

As a result of sharply divergent trends in transit use and auto ownership per capita, transit accounted for only 2.5 percent of total daily travel in United States metropolitan areas in 1983 (Klinger and Kuzmyak, 1986, p. 6-23). Private vehicles, which are used for the vast majority of urban tripmaking, accounted for 81.3 percent of all urban trips in 1983. Since total tripmaking has increased and annual transit boardings are now slightly less than they were in 1983, the fraction of metropolitan area trips that are by transit must be less today than it was in 1983. Preliminary estimates from the 1990 Nationwide Personal Transportation Study (NPTS) indicate that public transportation modes accounted for only two percent of both person trips and person miles in 1990 (Jarema, 1991).[*]

The Critical Role of Rising Per Capita Incomes

While the causes of the auto ownership and transit use trends depicted in Figure 1 are many and complex, the more than four fold increase in per capita income that has occurred since 1900 is clearly the dominant factor.[**] Transit is cheaper in terms of money outlays than private cars for most trips, but private car commutation is more convenient and faster. As real wages and per capita incomes rose during the past 70 years, increasing numbers of households and household members opted for the greater convenience and time savings afforded by private cars, and transit use steadily declined.[***]

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[*] As Jarema (1991) emphasizes, these preliminary estimates from the 1990 NPTS are based on only 40 percent of the final sample. This partial sample, moreover, is not representative; higher income households, for example, are overrepresented. No effort was made to correct for the preliminary estimates for these sampling problems.

[**] Support for this proposition is provided by Kain (1983, p. 4-5). He presents regression analyses which demonstrate that per capita income alone explains more than 80 percent of the variance in per capita auto ownership for five very different samples: a time series of annual U.S. data for the period 1900-1963; cross-section samples for 23 OECD countries in 1958 and 1968; and a cross section sample of the 68 non-Communist countries with per capita income greater than $300 in 1977.

[***] Kain (1983, p. 7) estimates real time costs to commuters rose from $0.81 per hour in 1930, to $1.62 per hour in 1947, to $2.84 per hour in 1978. He adds, that "the effects of this rapid

Rising per capita incomes also effected auto ownership and transit use in other, more indirect, ways. Households in the United States, and particularly those with children, have strong preferences for lower density housing arrangements. Rising incomes and higher levels of auto ownership enabled growing numbers of urban households to live in single family homes and in low density neighborhoods producing thereby a pronounced flattening of density functions for U.S. metropolitan areas (Harrison and Kain, 1974; Mills, 1970). As it is difficult for transit operators to provide frequent service between low density residential areas, the systematic choice of lower density living arrangements by growing numbers of Americans has further increased the relative advantage of private over public transportation for urban tripmaking.*

The effects of higher incomes and lower transport costs per mile on residential location decisions were reinforced by changes in the geographic distribution of employment within metropolitan areas (Meyer, Kain, and Wohl, 1965). At the same time that rising car ownership was enabling more Americans to live in single family homes in low density neighborhoods, steady improvements in the performance and capacity of trucks allowed growing numbers of employers to locate on cheaper land at ever increasing distances from the city core and from centrally located ports, rail terminals, marshalling yards, and other intercity freight and passenger facilities (Moses and Williamson, 1967). With rapid improvements in intercity highways and dramatic advances in air transportation after World War II, moreover, ever increasing growing shares of intercity passengers and freight were carried by highway and air. These rapid and dramatic changes in intercity transportation further reduced the advantages of central locations for growing numbers of employers.

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increase in time costs of travel - which explain much of the shift from slower to faster modes, as well as the growth of car ownership - are ... partially embodied in the reduced form estimates of the income elasticity of demand for auto ownership.' These elasticity estimates which were obtained from the regression equations described in the previous footnote vary between one and two.

* Kain (1983, p. 6, and 1988) and Kain, Fauth, and Zax, (1977) are but three of the dozens, if not hundreds, of empirical analyses that show the pronounced impact of net and gross population densities on the transit share of worktrips. Kain (1988), for example, shows the central city gross population density alone explains 78 percent of the variance in transit mode split (the percentage of worktrips by transit) in 43 of the 45 largest U.S. central cities.

Land use changes are important because the extent and pattern of urban tripmaking is ultimately determined by the spatial distribution of workplaces, residents, and other destinations.* With the passage of time, the slow growth or decline of central city employment and population, in combination with their rapid growth in suburban areas, led to major changes in urban travel patterns. The most important of these are discussed below, starting with the changes that have occurred in the locations of jobs and residences.

Job and Residence Locations

> By any measure, metropolitan growth since World War II has been rapid but unevenly distributed. Outlying portions of metropolitan areas have been growing quickly, while the central areas have been growing very little and, in a growing number of instances, have actually declined. During this period, what began as a relative decline became an absolute decline for a lengthening list of central cities (Kain, 1968).

The trends in the location of jobs and residences described by Kain in 1968 have continued unabated. Central cities in slowly growing Frostbelt metropolitan areas have continued to lose both jobs and residents, while their suburbs experienced rapid job and population growth. Central cities in many western and southern metropolitan areas, with abundant supplies of vacant land within their boundaries, grew rapidly in the period immediately following World War II. As Sunbelt central cities began to mature, and, more importantly, to exhaust their previously abundant supplies of vacant land, they have begun to experience noticeably slower growth, or even decline. This is particularly true of cities whose powers to annex undeveloped land beyond their boundaries are limited.

Central business district (CBD) employment levels are especially critical to transport planning, and particularly to ridership forecasts for proposed rail transit systems. While data on CBD employment levels are fragmentary and difficult to interpret, they, nonetheless, indicate that few CBD's have experienced significant employment growth since the end of World War II (Meyer, Kain, and Wohl, 1965; Meyer and Gomez-Ibanez, 1981). This conclusion will surprise many individuals who have mistaken the construction of office space within the CBD's of a number of large metropolitan areas with CBD employment growth. Because CBD employment levels are so critical to the success of rail transit investments, advocates of rail systems have consistently produced excessively optimistic forecasts of CBD employment growth (Kain, 1990).

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* The connections between the land use patterns and urban tripmaking have long been recognized. Nearly 40 years ago Robert Mitchell and Chester Rapkin (1954) wrote Urban Traffic: A Function of Land Use, a highly influential book, suggesting that the extent, composition, and pattern of urban tripmaking is determined by the pattern of land uses. This theoretical insight became the basis of what came to be known as the land-use, transportation model, and more recently in the United States, as the UTPS (Urban Transport Planning System) model.

The trends within metropolitan areas, described above, are reinforced by differential rates of regional growth. Newer, lower density metropolitan areas in the Sunbelt have grown much more rapidly than older, denser metropolitan areas in the Frostbelt.* Southern and western metropolitan areas, which have low central city densities and even lower densities overall, experienced most of their growth during periods when incomes were high and the private auto was the principal mode of urban tripmaking (Harrison and Kain, 1977).

The dispersed employment patterns and low population densities that characterize southern and western metropolitan areas make it difficult for transit operators to provide competitive services. As a result, the fractions of trips by transit are much lower than in older and denser metropolitan areas (Kain and Fauth, 1979). More rapid growth in areas with low levels of transit use and high levels of private automobile use, of course, reduces the average rates of transit use and increases the rates of auto use for the nation as a whole (Fulton, 1983).

Only very preliminary reports are available from the 1990 census. Nonetheless, these data indicate that the suburbanization and decentralization trends identified by Kain (1968), Meyer and Gomez-Ibanez (1981), and others are continuing. According to recently released data from the 1990 Census, only New York City, among large northern and eastern cities increased in population, and it grew by only 3.5 percent. Among other large central cities, Philadelphia's population declined by 6 percent, Detroit's by 15 percent, Chicago's by 7.4 percent, Newark's by 16 percent, Pittsburgh's by 13 percent, and Cleveland's by 12 percent (The Boston Globe, January 25, 1991, p. 14).

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* During 1970-1980, for example, the populations of metropolitan areas located in the South and West census regions increased by 22.2 and 28.4 percent respectively, while the populations of metropolitan areas located in the North Central census region increased by only 2.6 percent and those located in the Northeast actually declined by 1.8 percent (U.S. General Accounting Office, 1989, p. 16).

Racial Residential Segregation and Urban Tripmaking

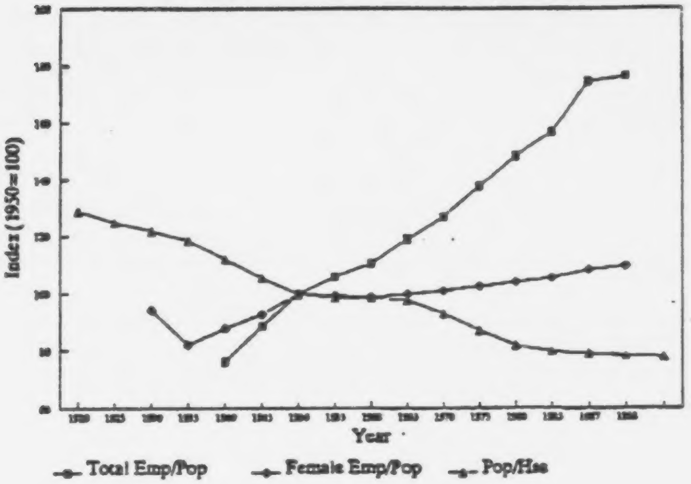
"Roughly half as many black households lived in the suburbs of American's metropolitan areas in 1980 as would be predicted on the basis of household income and family structure," and "current and past discrimination is the principal explanation" (Kain, 1985, p. 253). Housing market discrimination adversely effects the welfare of black Americans in many ways: it increases the cost and reduces the quality of housing available to them, it reduces their rates of home ownership, (severely impairing their ability to accumulate wealth); it limits their access, and, more importantly, their children's access to good schools; it adversely impacts their employment and income opportunities; and it has a number of other deleterious effects on black welfare (Kain, 1966 and 1976; Kain and Quigley, 1975).

Existing patterns of racial residential segregation also increase the amount of travel by both blacks and whites. Because they are effectively barred from suburban residence areas by housing market discrimination, disproportionate numbers of black workers must reverse commute to suburban workplaces. At the same time, the growth of massive low income central city ghettos, and the adverse environmental consequences of this growth, has discouraged (and crowded out) large numbers of centrally employed white households, who would otherwise have lived in neighborhoods convenient to their centrally located workplaces. As a result, central cities are much blacker and far poorer than they would be if housing market discrimination did not exist. This mismatch leads to more commuting by both black and white households than would occur in a world where black Americans had access to the entire metropolitan housing market on the same basis as whites. It follows that successful federal efforts to combat housing market discrimination would reduce urban travel and the need to construct more transport capacity (Kain, 1985a).

Changes in Demographic Structure

The declines in central city populations described above have somewhat smaller impacts on population urban tripmaking than might be imagined at first. As Figure 2 reveals, average household size has been declining steadily for most of this century. To a considerable extent, the previously discussed central city populations declines are the result of decreases in average household size. As a result, the declines in economically active populations of central cities have generally been

Figure 2. Indexes of Employment/Population by Sex and Persons/Households: 1920–1988 (1950=100)



much smaller than their declines in total population; indeed, in some cases, observed declines in central city population mask increases in the numbers of households and economically active population. The effects of declines in average household size on urban travel, moreover, have been accentuated by steady increases in employment/ population ratios. As the data in Figure 2 reveal, moreover, a large part of the recent growth in employment/population ratios is the result of an especially pronounced increas in female employment/population rates.

As the above discussion implies, changes in urban land use and in the demographic structure of the population, have been occurring since 1920 at least, and in many cases for even longer. The impacts of these trends on the extent, composition, and patterns of travel in the nation's metropolitan areas are discussed in the next section.

Changes in Travel Patterns

In addition to the steady decline in transit shares and the corresponding increase in the share of urban trips made by private modes, the changes in land uses and in the socio-demographic structure of the nation's population, discussed above, have had a number of other important impacts on urban travel patterns. These are briefly summarized below.

(1) As anticipated by Meyer, Kain, and Wohl (1965) a quarter of a century ago, radial trips to the central area have steadily decreased in numbers and relative importance. As Pisarski (1987, p. 38), referring to 1980 census data on the journey to work, observed, "the dominant flow pattern is now the suburb-to-suburb pattern at twice the size of suburb-to-central city travel." He adds that suburban commuting accounted for more than 80 percent of the total growth in journey to work travel in metropolitan areas between 1960 and 1980; of the 20 million increase in trips to work in metropolitan areas, 14 million were suburban-to-suburban worktrips.

(2) Work trips account for a decreasing share of all trips; the worktrip fraction of total daily trips fell from 29.3 percent in 1977 to 25.9 percent in 1990 (Klinger and Kuzmyak, 1986; Jerema, 1991). This trend, which occurred in spite of the rapid increase in the employment/population ratios discussed earlier, is explained by growth of per capita incomes and by the fact that per capita trips for "other" trip purposes are more strongly dependent than worktrips on per capita levels of income and vehicle ownership.

(3) Reflecting their rapid increases in labor force participation and changes in urban structure that have made transit less viable, both the fraction of females who have drivers licenses and the numbers of trips made by them have increased dramatically.

(4) Average vehicle occupancy has decreased steadily. Average vehicle occupancy (persons per vehicle) for all trip purposes declined from 1.7 in 1977 to 1.6 in 1983, and the decline for worktrips was from 1.3 to 1.2 over the same period. Preliminary data from the NPTS indicates the vehicle occupancy rates have continued to decline (Jarema, 1991; Klinger and Kuzmyak, 1986, p. 8.3). The continuous decline in vehicle occupancy rates is due to the growth in per capita incomes and auto ownership, in multiple car owning households, in the fraction of women drivers, as well as to the difficulty of forming carpools, the limited inducements for carpooling, and the pervasive mispricing of urban transport facilities.

Congestion and Mispricing

It is widely believed that congestion has been getting much worse during the past decade or so . Support for this view is provided by the FHWA, which estimates, that the percentage of all urban interstate miles that were "congested" increased from 31.5 to 46.7 percent between 1980 and 1987 (U.S. General Accounting Office, 1989, p. 48). The growth in congestion has been most severe in the suburban areas, and in rapidly growing Sunbelt metropolitan areas, such as Dallas, Houston, and Los Angeles.

This and other evidence of increased congestion have been used in preparing the estimates of the costs of congestion listed below:

> The California Chamber of Commerce estimated that traffic delays and rough roads cost motorists $135 a year in lost time and another $97 in fuel and maintenance costs.
>
> The Texas Transportation Institute ... estimated the 1986 per capita cost of congestion (user cost and additional fuel cost) at $330, without the added cost of higher insurance premiums associated with more congestion related accidents, and $400 per capita including the insurance adjustments.
>
> Various organizations in Southern California have estimated that traffic delays amount to 300,000 to 485,000 hours per day for motorists in the greater Los Angeles Area. ... the cost of these hours of delay is valued at over $507 million per year.
>
> The Southern California Association of Governments estimated the daily cost of recurring congestion in the Los Angeles region at over $7 million, using 1984 data and 1987 prices.
>
> FHWA estimated that traffic delays burn up about 1.4 million gallons of fuel annually and cause over $9 billion in user costs in terms of wasted time and fuel. These figures are predicted to grow to over 7.3 billion in wasted fuel and over $50 billion in user costs by 2005 (U.S. General Accounting Office, 1989, pp. 61-62).

These and similar estimates of the extent of growth in congestion, as well as doomsday projections of future congestion levels, have been widely used in efforts to justify major new highway programs, often in conjunction with data that show a growing gap between highway use and highway investment.[*]

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[*] The GAO report, cited earlier, observes that "while the overall number of vehicle miles traveled between 1960 and 1987 increased at around 3.7 percent per year, or about 168 percent, the

Evidence of worsening congestion, projections of future transit and congestion, and data on underinvestment in highways should be interpreted with some care. Information on congestion levels, which vary enormously by place and time of day, are difficult to aggregate or interpret for a single metropolitan area, let alone for the entire nation. In addition, there exists somewhat contradictory evidence suggesting that, as a result of employment dispersal and the suburbanization of the population, average trip lengths, for the journey to work at least, may be declining (Gordon, Kumar, and Richardson, 1989). In addition, the notion that congestion is caused by underinvestment in highway capacity is an oversimplification at best.

While a massive highway construction program would reduce congestion in many metropolitan areas, it would do very little to improve conditions in many others, and by itself would be a highly inefficient approach to reducing congestion. A couple of decades ago, I observed that 90 percent of the urban transportation problem (and congestion) was caused by the gross mispricing of perhaps five percent of the nation's highway capacity. While I was, and remain, uncertain about the precise fractions, my general observation, nonetheless, was, and remains, correct.

The costs of providing additional highway capacity differs greatly from one metropolitan area to another, and from one part of the same metropolitan area to another. Yet, with the important exception of congestion costs, users of urban streets and roads pay roughly the same amount per mile to use these facilities regardless of how much it would cost to increase capacity or the levels of congestion they impose on other road users. Since road space is not rationed by price, congestion becomes the rationing device. Congestion, however, is a very poor allocation device, and, as a result, relying on it leads to serious distortions in urban development patterns and to the huge time losses for both private individuals and firms referred to above (Meyer and Gomez-Ibanez, 1981, Chapter 11).

If congestion is becoming worse, the failure to charge road users prices that approximate the long run social costs of providing additional capacity is the primary cause. Congestion, which increases imposes large delays on urban tripmakers and on the producers of goods and services, who use urban highways to transport their goods

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number of new highway miles increased by only about 9 percent" (U.S. General Accounting Office, 1989, p. 16). GAO analysts obtained the data from a report prepared by the National Council on Public Works Improvement (1988).

and services. The resulting increases in the costs of producing goods and services both raises the prices domestic consumers must pay for them and reduces the competitiveness of U.S. exports in international markets.

The use of too much street and road space in congested areas by low occupancy vehicles also adversely affects transit speeds, reliability, and performance, and thereby creates something of a vicious cycle. High levels of congestion seriously degrade the performance of road based public transit vehicles, which in turn results in still more use of low occupancy vehicles, and still worse congestion. The introduction of either road pricing or management schemes that mimic efficient road pricing could lead to dramatic reductions in congestion and travel times in many situations, and thereby reduce the levels of both highway and public transport investment that would be required to serve a given population and employment pattern.

Unless the serious mispricing of urban streets and roads in large metropolitan areas is corrected, a massive highway construction program would provide some congestion relief, but much less than might be expected. One reason is that without appropriate pricing of this capacity, the higher speeds that result will induce commuters and other motorists to make longer and more frequent trips. Analyses by the author using cross-section data on trip length and travel times in 41 metropolitan areas indicates that a one percent increase in average worktrip speed leads to about a one-percent increase in worktrip length in miles.*

Appropriate Pricing and Urban Development

The current practice of treating costly highway facilities as though they are costless to build creates serious congestion and, worse yet, sends the wrong signals to employers and households in making their location decisions. Much of the opposition to policies that would raise the effective prices that are paid by vehicle users to use congested streets and roads comes from firms located in the CBD and from CBD property owners. The former fear higher charges for road use would reduce their sales and profits and the latter fear they would decrease CBD property values.

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* This result is based on a series of multiple regression equations estimated by the author. Average journey to work trip length (miles) is the dependent variable in this equation, and average speed, SMSA population, and income are the explanatory variables. Since all variables are transformed to natural logarithms, the regression coefficients may be interpreted as constant elasticities. This equation explains nearly 80 percent of the variance in average trip length; the t statistics are average speed (9.2), SMSA population (5.4), and median family income (1.6). The coefficient for average speed, moreover, remains approximately one when auto and truck and drive alone trips are used instead of all trips. Including percent single family, percent of units built before 1939, and the percent of units in structures with five or more units increases the coefficient (elasticity) for speed to 1.08.

While the objections of many property owners and businesses to various forms of road pricing are well known, it is less clear that they are justified. Their opposition is based on the presumption that charging vehicle users money to use congested facilities during peak periods would reduce the attractiveness of congested centers. Whether this is true, however, clearly depends on what is assumed about the level of transport investment that will be made, on how the costs of providing this additional capacity are assessed, and on how commuters and other vehicle users would respond to various types and levels of road pricing and to the congestion levels that would be associated with them.

Owners of CBD properties and properties located in other congested areas may be correct in opposing higher parking charges or restrictions on road use if they can be certain that local, state, and federal governments will provide as much capacity as would be required to provide congestion free conditions without an offsetting increase in the per trip charges on road users. If a failure to charge vehicles enough for the use of these facilities, however, leads to high levels of congestion, total transportation costs, including both out-of-pocket and time costs, will almost certainly be higher than if vehicle users were required to pay an amount that corresponds to the long run social costs of providing additional highway capacity.

Proposals for Public Policy

The solution economists most often propose to correct the mispricing of urban transportation infrastructure and services is implementation of a sophisticated road pricing scheme in which vehicle drivers would be charged finely graduated tolls that vary by time of day and location. While I have no problem with the economic rationale for such schemes, I have, nonetheless, been something of a skeptic about their actual use.

In addition to questions of political acceptability, I have had two principal kinds of concerns about sophisticated road pricing schemes. First, there are likely to be sizeable costs associated with implementing them. Keeping in mind my observation that 90 percent of the urban transportation problem (and congestion) is caused by gross underpricing of perhaps five percent of urban and highway capacity, it has long seemed to me that most of the benefits that would accrue from implementing a sophisticated marginal cost pricing scheme could be obtained from much less costly measures that are targeted to this five percent or so of roadway capacity. These measures would include surcharges on CBD parking and on parking in other congested centers, area licenses, and traffic engineering measures and street and highway designs that would give priority to, or allocate more road space to, buses, carpools, and other efficient users of road space (Kain, 1990b; Kain and Fauth, 1979).

At the same time, continuing advances in technology and decreases in the cost of equipment that might be used for a sophisticated road pricing scheme are such that the time may have arrived to seriously consider more sophisticated road pricing schemes. While I am not prepared to recommend implementation of such a system at this time, I would urge this committee to instruct the Department of Transportation to significantly increase their research on road pricing, and to encourage local governments to develop demonstration programs that would determine the responses of vehicle users and other groups to various forms of road pricing.

Sharply increase gas taxes. While gas taxes are a very imperfect way of charging for road use, there are strong arguments for sharply increasing them. Most of the impact of higher gas prices would be felt in greater fuel efficiency; even so, they would reduce trip lengths and total vehicle miles of travel somewhat, and would lead to some increase in carpool and transit mode splits (Kain, 1985b). The best available estimates suggest that a one percent in real gasoline prices would increase transit ridership by about two-tenths of one percent. Increases in gas prices would, of course, result in increases in carpooling as well.

Even without considering the beneficial effects higher gasoline taxes and prices would have on urban travel, there are strong arguments for sharply increasing gasoline taxes. The Gulf War is a vivid reminder of the gains in national security that would accrue to the nation from a reduction in petroleum use and imports. A huge trade deficit and a growing foreign indebtedness, moreover, ranks among the nation's most serious and difficult economic problems; unnecessarily large petroleum imports are a major contributor to this deficit.

The limited enthusiasm Germany and Japan have shown for the Gulf War is partially explained by their geopolitical history and fairly limited military capacity, but it also reflects the far greater energy efficiency they have achieved through taxation and other policies that have encouraged households and firms to economize on the use of petroleum products. While Japan, Germany, and other Western European countries are more heavily dependent on Gulf oil than the United States, they use much less oil and other energy sources than the U.S. per dollar of GNP (Kain, 1985b).

Eliminate employer parking subsidies. The elimination of free (subsidized) parking and an increase the amounts commuters to dense employment centers have to pay for parking would have a dramatic impact on the levels of congestion on facilities serving these centers, would encourage more urban tripmakers to choose modes that are efficient users of costly urban street space, and would thereby significantly reduce the levels of highway investment required to maintain a given level of mobility.

There is clear evidence that CBD parking charges are critical determinants of the fraction of CBD workers who choose transit. It is difficult to reconcile this fact with the widespread practice of local governments of subsidizing the parking of commuters and with the perverse treatment of parking subsidies in the federal tax code.

Pickrell (1990) estimates that "three quarters of those who drive to work in U.S. cities use parking that is provided by their employers, for which 90 percent pay no charge." He adds that "by offering free parking, employers substantially reduce the cost at which their employers can drive to work," and concludes that "the best estimate appears to be that at least 20 percent of commuters who now drive alone would instead choose to carpool or use public transit if they were required to pay market rates for parking they now receive free of charge." Pickrell adds the following general observations about existing practices and their causes.

> The major reason that so many employers provide free parking is its tax exempt status, which stems from its classification under the Tax Reform Act of 1984 as a "working condition benefit." ... Unlike the tax exemption of fringe benefits such as health insurance and retirement savings, which encourages behavior that federal policy deems socially responsible, exempting the value of employer provided parking from income taxation rewards behavior that aggravates transportation problems and environmental consequences. The nation is unlikely to

> meet its repeatedly proclaimed goals of utilizing its transportation investments more efficiently, improving urban air quality, and reducing it dependence on non-renewable resources -- all which depend partly on substituting carpool and transit travel for driving alone -- as long as much parking continues to be supplied free of charge to commuters (Pickrell, 1990).

Encourage greater use of tolls and bus/carpool priority on bridges, tunnels, and other choke points. Costly water crossings channel traffic and provide opportunities to manage the urban street and road networks. The New York metropolitan area, the San Francisco-Oakland Bay Area, and Vancouver have implemented a variety of preferential toll, HOV facilities, and simple queue jumpers at the approaches to their bridges and tunnels that connect their central areas to the rest of the region. These measures, described in Kain (1990, Chapters 2-4), have enjoyed considerable success in inducing higher levels of transit use and carpooling but have far wider applicability.

While I am uncertain of just what form legislation might take, efforts should be made to devise incentives that would encourage state and local authorities to exploit these and similar opportunities to manage their road systems, and to reduce congestion by giving priority to more efficient road users (buses and carpools). At minimum, Federal legislation should be carefully scrutinized to insure that there are no Federal legislative barriers to implementing such measures.

Replace the federal discretionary capital grants program for transit with a single annual grant. The availability of federal discretionary capital grants for transit, the so-called new rail starts program, has encouraged regional transit authorities (governments) to plan and build costly rail transit systems that, at best, do little to increase transit ridership, and, at worst lead to actual declines (CBO, 1988; Kain, 1988 and 1990).

While advocates of inappropriate rail systems frequently try to justify them in terms of increased transit ridership, reductions in air pollution, reductions in highway congestion, and similar quantifiable benefits, it is clear that these "transportation" objectives have little or nothing to do with the persistent interest in building inappropriate rail systems in small and low density metropolitan areas.

It is easy to demonstrate that, in these situations, increases in transit use, as well as the various indirect benefits that are related to ridership increases, could be achieved at far lower cost by using other transport investments and policies. The disinterest of rail advocates in such calculations demonstrates that these "transportation" benefits have little to do with the enthusiasm for building rail systems in many small and low density metropolitan areas. Some advocates of these systems want to build rail because they will benefit directly from its construction (equipment suppliers and consultants) or indirectly through anticipated increases in property values. Still others advocate building a rail system as a way of improving the image of Dallas, Phoenix, Houston, Minneapolis-St. Paul, etc., and because "it is impossible to be a world class city without rail."

The availability of Federal capital grants that reduce the local cost of building these systems makes it easier for advocates to persuade local taxpayers to support their efforts. The availability of these grants allows them to claim that the projects are "free" (paid for by the Federal government) or provide large benefits to the local area in the form of jobs and higher local tax revenues. These "local" benefits, of course, do not exist from the vantage point of the nation as a whole.

There is no national purpose that I can perceive that justifies spending either funds earmarked for transit or general revenues on these costly efforts to make a growing list of small and/or low density metropolitan areas/cities feel good about themselves. At minimum, such expenditures, if they have no valid transportation purpose, as most do not, should have to compete for resources with other "image building" investments and should generally be funded locally. Funding them under the guise of transportation improvements is wasteful, and discourages these areas from dealing seriously with their transportation problems.

Provide funding for retrofitting existing urban toll roads for transit use and encourage toll road operators to implement toll schemes that encourage car pool and transit use. At least two cities, Dallas and Boston, currently have urban toll roads that serve their central areas, and others are considering such facilities. While these facilities are currently used by some bus services, fairly low-cost modifications (the provision of bus-only slip ramps, etc.) might increase their potential as bus rapid transit facilities considerably.

While there are undoubtedly both technical and legal obstacles to such modifications, the first step would be to carry-out feasibility and benefit-cost analyses. If, as I suspect, such modifications would be a cost-effective way of increasing transit use, these capital improvements should be made eligible for either federal highway or mass transit funding, or both.

Federal legislation and policy should also encourage toll road authorities to introduce preferential tolls for carpools and buses, and, where queues exist at toll booths, to provide bus and carpool bypass lanes. Toll road authorities should also be encouraged to modify their toll schedules to encourage off-peak travel and greater bus and carpool use during peak hours. Fairly serious congestion is beginning to develop on both the Dallas and Boston toll roads during peak periods. The toll road authorities in both metropolitan areas should be encouraged to raise peak period tolls for low occupancy vehicles and to provide preferential peak period tolls and other incentives to buses and carpools.

Provide incentives for the construction of bus-carpool HOV (High Occupancy Vehicle) facilities as part of both new highway construction and the reconstruction of existing facilities. The growing experience with transitways, commuter lanes, and other bus-HOV facilities demonstrates the cost-effectiveness of such facilities Kain (1990b). As Table 1 indicates, when construction cost per round trip is used to measure of cost-effectiveness, the per trip costs for the El Monte Busway, Shirley Highway, and Houston Transitways are between 10 and 27 percent as large as those

Mile and Per Round Trip for Transitways, Commuter Lanes, Exclusive Busways, and Light and Heavy Rail Systems

Facility	Miles	Daily Person Trips Transit	Daily Person Trips Total	Construction Costs (millions 1988 $'s) Total	Construction Costs (millions 1988 $'s) Mile	Construction Cost/ Round Trip Transit	Construction Cost/ Round Trip Total	Percent of LRT
Transitways								
El Monte Busway	11.0	13,221	43,000	$108.3	$8.8	$18,379	$5,036	13.2%
Shirley Highway	12.0	28,140	63,486	$122.9	$10.2	$8,735	$3,872	10.1%
Houston Transitways	36.6	21,479	42,420	$221.2	$6.0	$20,597	$10,429	27.2%
Commuter Lanes								
I-95, N. Va.	6.0	5,670	27,630	$5.6	$0.9	$1,975	$405	1.1%
Rte 91 S. Cal.	8.0	NA	19,102	$0.2	$0.03	NA	$21	0.1%
Exclusive Busways								
Ottawa	12.8	200,000	200,000	$388.0	$30.3	$3,880	$3,880	10.1%
Pittsburgh	10.8	47,000	47,000	$174.1	$16.1	$7,410	$7,410	19.3%
New Rail Systems								
Avg Heavy Rail	29.0	168,500	168,500	$3,329.5	$114.8	$39,519	$39,519	103.2%
Avg Light Rail	12.6	23,475	23,475	$449.5	$35.7	$38,296	$38,296	100.0%

Source: Kain (1990b), Table 17-2.

of the four federally funded light rail systems studied by Pickrell (1990).* Use of more recent ridership data for Houston, moreover, would result in comparisons that are even more favorable to transitways.**

Once again, I will leave it to others to suggest the precise form these incentives might take. State and local authorities, however, should be allowed/encouraged to use either federal highway or transit funds to construct transitway, bus/carpool lanes and other HOV facilities. In addition, if the federal discretionary capital grant program for transit is retained, Congress and UMTA should permit/encourage authorities that have been given commitments under this program to use them for either rail construction or for the construction of more cost-effective exclusive busways or transitways, as long as the benefits to transit users and/or carpools are sufficient to justify building the project.

While such transitways, busways, and bus-carpool lanes appear to be eligible for new-starts funding, their eligibility should be emphasized. Authorities in Houston, at least, appear to be doubtful about whether the $155 million in rail starts money that has been earmarked for Houston's, yet to be specified, rail system could be used to build busways or transitways, if subsequent analyses demonstrate the superiority of these alternatives (Kain, 1990c). Whatever the reasons or reality, it is widely believed in Houston that the earmarked funds can only be used to build rail.

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* The Executive Summary for Kain (1990b) is included as an attachment to this statement.

** The Houston figures in Table 1 include ridership and cost data for two partially completed transitways. In addition, the North Transitway, which did not allow carpools at the time Table 1 was prepared, has subsequently been opened to carpools. The decision to allow carpools increased daily person trip use of the North Transitway by 15.3 percent.

Use of the other transitways has increased by even larger amounts. The most recent ridership figures available to the author indicate that Houston's transitways carried 54,629 person per day during July 1990, an increase of 28.8 percent over the figures shown in Table 1. The impact of this ridership growth on the cost-effectiveness figures shown in Table 1 is not readily apparent, however. The capital cost figures used in calculating the cost effectiveness measures in Table 1 included only operational segments. Part of the ridership growth may be attributable to the completion of additional segments, and there were some capital costs associated with the retrofitting the North Transitway for carpool use.

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Increasing the Productivity of the Nation's Urban Transportation Infrastructure: Measures to Increase Transit Use and Carpooling:

An Executive Summary

This report surveys the growing use of bus and carpool priority measures to increase the productivity of the nation's transportation infrastructure. While it identifies a wide variety of priority measures, the report principally focuses on the planning and operation of exclusive and shared busways and high occupancy vehicle (HOV) facilities.

Chapters 3-12 present detailed case studies describing the implementation of exclusive busways, transitways, and other bus and carpool priority schemes in seven North American metropolitan areas (New York, San Francisco-Oakland, Ottawa-Carleton, Pittsburgh, Washington, D.C., Los Angeles-Long Beach-Orange County, and Houston). Chapter 2 provides less extensive evaluations of schemes implemented in other areas. Chapters 16 and 17 compare the cost-effectiveness of exclusive busways and bus-HOV facilities with the cost-effectiveness of recently completed light and heavy rail lines. Finally, Chapters 13-15 consider the problems of serving large downtown areas, something that many observers view as the Achilles heel of all-bus systems.

Exploiting Water Barriers

This survey of operational bus-carpool priority schemes demonstrates once again that necessity is the mother of invention. Some of the earliest, and still most effective, bus and carpool priority schemes were implemented at bridge and tunnel approaches in the New York, San Francisco-Oakland, and Vancouver metropolitan areas, where the prohibitive expense of providing additional water crossings prompted transport planners to consider innovative and low capital cost ways of increasing the passenger capacity of these critical facilities. As we discuss in the body of the report, these measures include both toll exemptions and discounts for buses and or carpools, and short queue jumpers that allow buses to bypass the heavy congestion that invariably occurs at the approaches to these facilities.

The New York metropolitan area has the most extensive facilities of this kind; six bus-carpool priority schemes serve 121,000 daily bus commuters to Manhattan during the three hour morning peak period. The most important of these, the four mile long XBL contra-flow-Lincoln Tunnel scheme, currently accommodates about 1,900 inbound buses and 69,000 inbound bus person trips per day.

Cost Effectiveness

Chapters 16 and 17 of the report provide strong confirmation of the findings of earlier scholarly studies of the comparative costs of alternative high performance transit modes. They demonstrate that exclusive busways generally have lower capital and operating costs than light or heavy rail systems and provide comparable or better levels of service.

The problem with both busways and light and heavy rail systems in most applications in North America is that existing levels of transit demand require only a small fraction of available right-of-way capacity. Nothing can be done about this problem in the case of rail systems, but high performance bus systems can often be designed to allow buses to share this excess capacity with other users, typically carpools and vanpools.

Both the El Monte Busway and the Shirley Highway operated for several years as exclusive busways. They were finally converted to bus-vanpool-carpool facilities when it became apparent that the numbers of buses required to serve existing and likely future transit riders required only a small fraction of busway capacity. Buses currently use less than 10 percent of the capacity of the Shirley Highway's two HOV lanes during peak hours; making the remaining unused capacity available to carpools and vanpools enables these lanes able to accommodate 2.2 times as many person trips per day as if only buses were allowed to use them.

Table ES-1 provides summary cost effectiveness measures for the El Monte Busway and the Shirley Highway, for operational segments of Houston's approved 95 mile transitway system, for commuter/diamond lanes in Virginia and California, for Ottawa's and Pittsburgh's exclusive busways, and for the recently completed light and heavy rail systems studied by Pickrell (1989).

Capital costs per daily transit round trip in 1989 dollars for the El Monte Busway and Shirley Highway HOV lanes are $16,260 and $8,868 respectively, as compared to $3,995 and

Table ES-1. Facility Length, Construction Costs, Daily Ridership, and Cost Per Mile and Per Round Trip for Transitways, Commuter Lanes, Exclusive Busways, and Light and Heavy Rail Systems

		Daily Person Trips		Construction Costs (millions 1988 $'s)		Construction Cost/ Round Trip		Percent
Facility	Miles	Transit	Total	Total	Mile	Transit	Total	of LRT
Transitways								
El Monte Busway	11.0	13,221	43,000	$108.3	$9.8	$16,379	$5,036	13.2%
Shirley Highway	12.0	28,140	63,486	$122.9	$10.2	$8,735	$3,872	10.1%
Houston Transitways	36.6	21,479	42,420	$221.2	$6.0	$20,597	$10,429	27.2%
Commuter Lanes								
I-95, N. Va.	6.0	5,670	27,630	$5.6	$0.9	$1,975	$405	1.1%
Rte 91 S. Cal.-	8.0	NA	19,102	$0.2	$0.03	NA	$21	0.1%
Exclusive Busways								
Ottawa	12.8	200,000	200,000	$388.0	$30.3	$3,880	$3,880	10.1%
Pittsburgh	10.8	47,000	47,000	$174.1	$16.1	$7,410	$7,410	19.3%
New Rail Systems								
Avg Heavy Rail	29.0	168,500	168,500	$3,329.5	$114.9	$39,519	$39,519	103.2%
Avg Light Rail	12.6	23,475	23,475	$449.5	$35.7	$38,296	$38,296	100.0%

Source: Table 17-2 of this report.

$7,470 for Ottawa's and Pittsburgh's exclusive busways. Including carpools and vanpools in the denominator reduces the average daily per round trip costs for the bus-HOV facilities by a large amount. At $4,999 and $3,931, the capital costs per total (buses plus carpools and vanpools) daily round trip of the El Monte Busway and the Shirley Highway HOV lanes are significantly less than the $7,470 per round trip capital cost of Pittsburgh's exclusive busways and close to the $3,995 per round trip capital cost attained by Ottawa's innovative exclusive busways.

The last (shaded) column in Table ES-1 reveals that the per round trip capital costs of the Ottawa and Pittsburgh exclusive busways are only 10.1 percent and 19.1 percent as large as those of the four recently completed light rail transit (LRT) systems studied by Pickrell (1989). Similarly, per round trip capital costs as a fraction of LRT costs for the three transitways shown in Table ES-1 vary from 10.1 percent in the case of the Shirley Highway to 27.2 percent for Houston's 36.6 miles of operational transitways. Use of the Houston transitways is expected to increase substantially as uncompleted segments the Gulf and Northwest Transitways are opened. Somewhat surprisingly, the average per daily round trip capital costs in 1989 dollars of the eight light and heavy rail systems studied by Pickrell (1989), i.e. $39,038 and $40,285, differ by less than four percent.

What are variously referred to as commuter or diamond lanes fare even better when capital costs per daily round trip are used to measure cost-effectiveness. The incremental capital costs in 1989 dollars of the two commuter/diamond lane facilities shown in Table ES-1 are $413 per round trip for the I-95 diamond lanes in Northern Virginia and $23 per round trip for Southern California's Route 55 commuter lane.

As we discuss in Chapter 17, the critical term here is "incremental." Commuter/diamond lanes are primarily carpool lanes and serve relatively few transit trips; they are usually considered temporary facilities and plans frequently exist to replace them with more costly, physically segregated transitways at some future date. Commuter/diamond lanes, which are usually carved out of existing freeway right-of-ways by narrowing lanes, by eliminating or narrowing the medians and inside shoulders, and by similar measures, cost very little to build. The cost of providing these facilities consists principally of the opportunity costs of not using them as a general traffic lanes, and the adverse impacts on capacity, safety, and aesthetics of reducing original freeway design standards.

The Problems of Downtown Distribution

The problems of serving the CBDs of large cities are widely viewed as the Achilles heel of all bus systems, and the supposed inability of all bus systems to accommodate projected levels of transit use is a frequent justification for making the large capital expenditures required to build new light and heavy rail systems. Analyses included in this report demonstrate that while buses carry a large fraction of peak period person trips in the CBDs of large cities, they use relatively little CBD street space. Even the small amounts of street space used by buses, moreover, can be reduced by inexpensive changes in bus operations and by providing off-street bus facilities.

If further reductions in the bus use of CBD streets are desired, downtown people movers and bus tunnels can be used to augment CBD street space and to improve circulation within downtown. While these solutions are less expensive than building an entire regional rail system, they are by no means cheap.

Built at costs of $178 million and $219 million (1989 dollars), recently completed downtown people movers in Miami and Detroit have been a disappointment to their supporters. They are currently carrying only about 11,000 riders a day each, and very few of these users are commuters

Bus tunnels are even more expensive. Seattle spent $371.8 million (1989 dollars) to build a 1.3 mile L shaped CBD bus tunnel. Ottawa, which is seriously considering building a CBD bus tunnel to replace the at-grade bus lanes that currently serve as the downtown link of its innovative exclusive busway system, estimates that the construction cost of its proposed bus tunnel will be similar to that of Seattle's bus tunnel.

Seattle's bus tunnel will not eliminate all buses from the CBDs surface streets anymore than building a light or heavy rail system would. The project's Final EIS found that the number of buses using CBD surface streets in 1990 would be 642 if the tunnel was built as contrasted to 488 if a transit mall was built instead.

Since the estimated construction costs for Seattle bus tunnel were $259.4 million (1989 dollars) greater than the estimated costs of a mall similar to Portland's operational transit mall, Seattle is spending about $1.7 million (1989 dollars) per bus for each of the 154 buses the tunnel would remove from the city's CBD streets in 1990. The capital cost per bus removed from downtown streets would be even greater if the projected capital costs of Seattle Non-Intercept Mall alternative, which seem high, are overstated.

Seattle's bus tunnel, which increasingly looks like a Trojan Horse for a coveted LRT system, will be equipped with tracks before it opens, even though there currently exists no "approved" rail plan for the region.

Demographic Trends and Transportation Demand: Planning and Environmental Issues

Statement prepared for the Hearing of the

Committee on Environment and Public Works
Subcommittee on Water Resources, Transportation, and Infrastructure
United States Senate
Washington, D.C. 20510

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February 7, 1991

For more than three decades, completion of the Interstate highway system has been the backbone of the United States' transportation program. As the era of Interstate construction draws to a close, the reauthorization of the Surface Transportation Act offers a major opportunity to redefine and redirect federal and state transportation programs. Changes in the economy, in population characteristics, in social organization and life styles, and in their spatial distribution have produced patterns of transportation demand that are notably different from those of earlier years. In addition, public policy initiatives in the areas of environment and energy, congestion relief, and transportation-urban development relationships have changed both opportunities and constraints facing transportation programs. A sound response to these changes will require not only renewed commitment to funding but also increased support for the development of innovative organizational arrangements and decision-making processes, capable of carrying out multi-modal, flexible, socially and environmentally responsive, and economically sound transportation planning and investment.

This paper reviews key factors affecting transportation demand and discusses their implications for transportation policy, giving particular emphasis to planning and environmental considerations. It argues that there is a need for 1) a strengthened urban-metropolitan planning process which can incorporate and reconcile mobility and environmental objectives, 2) increased recognition and accommodation of emerging technologies, investment strategies, and pricing policies, and 3) incentives for institutional development to support multi-modal planning and investment.

The Changing Nature of Demand for Transportation Services

1. Economic and Demographic Factors

Growth and change in the economy, in the ways in which production is organized, and in population, household size and structure, income, and activities all affect the requirements placed upon transportation systems. Some factors that have significant bearing on the demand for transportation are the following.

- Changing methods of production and management: Rapid growth in the output of high value commodities has led to the use of "just in time" production practices (which minimize inventory costs) and to increased concern about potential costs due to loss or damage during shipment. This, in turn, has placed increased emphasis on faster, more reliable forms of freight service. Shippers have become more systems minded in their approach to freight transportation, more explicitly treating it as a cost that can be traded off against other input cost and quality considerations. Both of these trends have tended to favor truck (and air freight) over rail. At the same time, increasing product specialization and substitution of more distant resources for local ones (e.g., lumber) has resulted in longer lengths of hauls for many products.

- Increased trade with Pacific Rim nations: Both raw materials and finished products now flow to and from Japan, Korea, China, Singapore, and many other Far Eastern nations. Trans-Pacific trade actually exceeded trans-Atlantic trade for the first time in 1982. Demand for better access to West Coast ports has grown accordingly.

- Growth in the service sector of the economy: Nationwide, service activities have grown faster than any other sector of the economy over the past two decades. The service sector is somewhat more dependent on passenger transportation (for business travel) and considerably less dependent on freight transport than is heavy manufacturing. Moreover, growth outside the service industries has been concentrated in sectors with relatively low freight input requirements (such as computers and electronics). This is the primary reason for slow overall growth in freight tonnage. In addition, the service sector, and the new light industries, are more "footloose" than earlier industries, allowing them a wider range of choices of location.

- Increasing population and population shifts: While the rate of increase has slowed from historic levels, population increases will translate into increases in demand and altered demand patterns for both personal transportation and freight transport. These increases will be felt especially in the high-growth areas of the country, particularly the West and South.

- An aging population: The age of the U.S. population is increasing, from a median of 30 in 1980 to an estimated 36 by the end of the century. An older population implies an older and probably wealthier work force with a greater ability to purchase consumer goods, including automobiles and single family housing (although the size of housing units may decrease). The effect of an increase in the elderly population is harder to interpret. Some of the elderly will face restricted incomes and are likely to depend on public transportation for their basic travel needs, while others (especially the 'young-elderly') will continue to own and drive automobiles and undertake leisure travel and other discretionary activities. An emerging 'elderly-elderly' class may have still different transportation and other needs.

- More households: Lower birth rates and the changing age structure are reflected in increasing rates of household formation, a trend that is expected to continue. Shrinking household size and shifting household composition (including single person and single parent households, households composed of unrelated adults, and married couples with no children at home) also suggest changes in housing type and location choice that could lead to very different and as-yet poorly understood patterns.

- Increased labor force participation: The percentage of the adult population in the work force has grown rapidly in the past two decades, and this growth is expected to continue for some 20 years hence. Commute travel, as well as business-related travel, should grow proportionately. Of particular note is the growth in the number of working women, including married women and women with children, over half of whom are now working part- or full-time. Since many of these women continue to bear primary responsibility for child care and shopping trips, their journeys to work tend to be more complex and time-constrained than those of their male counterparts.

- Slowly increasing real incomes: Although on average, real incomes have been nearly stagnant (and in some areas are lower than they were some years ago) the expectation is that increases will occur over the next 15 years. To the extent that these increases translate into more disposable income, increases in auto use and in discretionary travel, both local and intercity, may result.

  Income gains are not likely to be evenly shared. Indeed, the growing disparity between the poor and the affluent has been highly visible over the past decade, and this disparity reflected in transportation as well as other sectors. Even among moderate income households, incomes are unlikely to increase as fast as housing costs in many areas of the country, and thus tradeoffs between longer commutes and affordable housing (or more house for the money) seem likely to figure prominently in future.

- Nearly ubiquitous auto ownership: The number of autos per licensed driver continues to increase throughout the U.S., and a growing number of households own more autos than they have licensed drivers. Even among the lowest income quintile, among elderly and very young households, and among recent immigrants, substantial majorities own automobiles. Thus, auto ownership is a declining factor in travel choices -- but those who do lack access to an automobile are severely disadvantaged from a transportation perspective, since alternative modes provide comparable access and mobility at relatively few locations.

- Suburbanization of both population and employment, as well as rapid growth in small metropolitan areas and towns at or beyond the metropolitan fringe: While development and revitalization of older urban cores have continued in many areas, a stronger trend has been toward suburban and fringe-suburban growth. Development of housing, industrial parks, and office complexes in these outlying areas has shifted both commute patterns and the origins and destinations of other trips. Today, half of metropolitan work trips occur entirely in the suburbs. In addition, increasing numbers of commuters live beyond the traditional metropolitan boundaries and work in suburban job centers, and some have left the major metropolitan areas altogether for jobs and housing in rural or semi-rural areas. In many cases, these shifts are putting a strain on street and freeway systems designed for much lower levels of activity, and creating demand for major infrastructure additions or expansions and for public commute modes.

- Increasing share of trips for purposes other than work: Work trips account for less than 30 percent of the vehicle-miles of travel and less than 25 percent of all trips made in most metropolitan areas. Even during peak periods, trips for shopping, personal business, and socio-recreational purposes account for a large part of the vehicles on the road. The growth in non-work travel is a major factor in the rapid VMT growth of recent years.

- Increases in vacation and holiday time: Some observers predict that the American workforce will receive increases in vacation and holiday time over the next few decades, although not all workers are expected to enjoy these benefits. Along with growth in disposable income, increased time off should lead to an increase in recreational travel, both in local and intercity trips and international tourism.

Overall, the economic and demographic trends point to an increasingly suburban and auto-oriented future, which could be moderated (but hardly halted or reversed) through major public policy intervention.

2. Public Policy Impacts

Public policy does have potentially significant effects on travel demand. Federal, state and local policies concerning transit and highway investments, innovations in technology, and new approaches to management and finance shape travel options and hence travel choices. Environmental goals, in particular air quality requirements, increasingly influence the options considered and the decisions made. Key policy areas include the following.

- State and local highway finance and highway development policy: While federal policy is a key shaper highway programs, some of the states are reorganizing their own highway programs in potentially significant ways. In several parts of the country local government also is playing a much larger role in highway programs than in years past. State and local initiatives in highway finance range from tax increases to fund a new round of investments, to toll roads and greater private sector involvement in highway design, construction, and operation. Efforts to develop improved highway designs and operations strategies in order to reduce costs and improve services are also underway, and include relatively modest efforts to improve traffic signal timing and advise motorists of travel conditions, as well as high technology R & D efforts aimed at producing automated highways capable of carrying vehicles at high speeds and close headways (perhaps double or triple current values.) These initiatives open up important possibilities for innovation.

- State and local transit policy: In several states policies that could significantly alter transit planning, development, and finance also are being debated. Transit finance is a key topic of these debates, and a wide array of financing mechanisms are being revisited as means to supplement farebox revenues, from higher user fees coupled with subsidies to low-income riders, to benefit assessment districts, property tax levies, bonds, and earmarked sales taxes. While resistance to increased taxes and fees is prevalent in many localities, some areas are showing an increased willingness to finance clearly defined transit projects and programs. In addition, public-private partnerships for transit finance are an area of increased activity.

Transit officials and state and local leaders also are rethinking policies on transportation service deployment. Some initiatives seek to encourage development patterns around transit stations that would build markets for the facilities. Others seek to set criteria for development densities and other factors needed to make conventional transit services work, and to substitute paratransit in areas likely to fall below the required levels of transit use.

Finally, in some areas, new technologies are being considered. For example, high-speed rail (whether using conventional rail or newer formats such as magnetic levitation) is being evaluated as a possible supplement and complement to regular intra-urban services. Possible applications include connecting the centers in a multi-centered metropolitan region and providing access to remote airports, as well as serving certain medium-haul inter-city markets.

- Transportation-air quality and other environmental policies: Public concern about the impacts of transportation on the natural and built environment remains strong, and federal and state mandates for affirmative environmental protection and enhancement are growing. A prime example is the Clean Air Act Amendments of 1990, which set forth detailed requirements for transportation controls in metropolitan areas unable to meet national ambient air quality standards, backed by tough provisions requiring conformity between transportation plans and programs and state air quality plans. The Act will necessitate re-thinking transportation, air quality, and growth relationships, as well as improvements in the methods used to analyze short-term and long-term transportation emissions and air quality. Initiatives in other areas, including transportation noise, impacts on water resources and wetlands, and losses of farmland and open space also seem likely to require more vigorous and explicit consideration of the environment in transportation planning and decision-making.

- Policies in response to pressures for congestion relief: Citizen pressures for solutions to growing congestion problems both in central cities and in the suburbs will color policy toward transportation over the next decades. In the past, the traditional public sector response to congestion was to increase capacity by building more roads. But in recent years shrinking public revenues and escalating costs have severely constrained this option, and concerns about highway construction's adverse social and environmental impacts have led many to question the advisability of continued highway expansion. Alternative strategies that might offer congestion relief or at least avoid a worsening of conditions include methods to make better use of available capacity and improve traffic flow; strategies for encouraging the use of alternatives to the automobile, especially for commute trips; and strategies for reducing overall trip-making.

- Energy issues: Transportation is heavily dependent on petroleum energy, and although petroleum prices remain low, current events are a reminder of the nation's potential vulnerability to petroleum price shocks or supply curtailments. Conservation programs may again be introduced, or another round of fuel efficiency standards imposed. However, price adjustments might offer an alternative approach. In the short run higher fuel prices would encourage voluntary curtailment of discretionary trips and some shift in travel mode and travel destination. In the longer run higher prices would act as an incentive for more efficient vehicles, trip making, and land use patterns.

Overall, federal transportation policy will operate in an environment of increased state and local attention to new transportation development and finance mechanisms, to congestion relief, and to environment and energy concerns, and it may accentuate these issues and/or offer opportunities for better integration.

3. Trends in Land Use and Transportation Planning

A third set of factors affecting travel demand involves land use and development and related transportation development policies and practices. Three trends are: (1) a larger role for the private sector in the provision or funding of transportation facilities and services needed to support new development; (2) growing interest in coordinating land use and transportation planning; and (3) continuing desires to use transit as a means of structuring urban form.

- Private sector participation in transportation needed to support development: For many years, local governments have required developers to provide or finance certain transportation facilities, such as streets within their subdivisions and off-street parking for commercial buildings. Recently, however, the growing gap between costs of providing transportation facilities and services and the public revenues available for providing them has led to two forms of private sector participation in transportation. One is developer- or business-initiated investments in transportation facilities and programs, ranging from toll roads and transit lines to transportation system management (TSM) programs -- investments that are made, for the most part, in order to enhance land accessibility and public support for development. The other type of private sector involvement occurs at local government's behest, and consists of government-imposed exactions and impact fees for transportation. Both have some potential for affecting transport markets, financing, and service opportunities.

- Coordinated land use and transportation planning: Another approach gaining increasing attention involves better coordination of transportation capacities with development patterns and levels and desired travel choices. Policies are being utilized include growth management options (i.e., restricting uses which generate large numbers of peak-period auto trips, and/or reducing the total amount of development that will be permitted); planning and zoning that focus development in those areas where transportation capacity is available; and site design requirements aimed at creating an environment that makes good transit service feasible.

  Specific planning and zoning strategies include jobs-housing balance requirements; caps on the number of housing permits and/or square feet of commercial development that can be approved per year, tied to the pace of transportation improvement programs and/or service expansions; adequate public facilities provisions requiring compliance with minimum performance and level of service standards; conditional zoning allowing more intense development if impacts are fully mitigated and/or sufficient points are earned for additional publicly desired services; and density increases and/or bonuses in areas well served by transit. Transportation-related site design strategies include clustering of buildings to make walking, biking, and other commute alternatives more feasible and attractive; site design requirements for bike lanes, pedestrian pathways, transit turnouts and shelters, and preferential parking for carpools and vanpools; and requirements for the provision of on-site services such as convenience stores and child care facilities, to reduce the need for auto use. Mostly, the strategies are implemented by local government, but some regional and state-level initiatives are beginning to appear as well.

- Use of transportation as a means of structuring urban form: Local officials and citizen groups often advocate the use of transportation as a mechanism for both stimulating and reorganizing urban growth patterns. In particular, many have high expectations that rail transit will support and encourage higher density and more compact development, help maintain or revitalize central business districts, and retard urban sprawl and loss of open space. However, evidence on transit's ability to focus growth suggests that positive impacts result only if a number of supportive conditions are present. A growing regional economy, the availability of suitable developable land, and local government policies supporting transit-oriented development all seem to be prerequisites if substantial land use impact is to occur.

  Strategies increasingly are being proposed to help assure positive land use such impacts. For transit, the strategies include higher-density zoning and density bonuses near transit stations and corridors; public-private partnerships for land acquisition and assembly in these areas; and joint development of stations and other activity centers. Similar proposals are beginning to appear for highways, including access control and acquisition and development of excess right-of-way. In some cases the policies are intended to produce revenues to help support capital and/or operating expenses.

In general, the interest in coordinating land development and transportation reflects a growing conviction in many states and metropolitan regions that policy focused solely on transportation deployment too often will fall short of objectives, or have unintended and undesired consequences. Here, too, federal programs will operate in a changed environment from that of earlier decades, though because the differences in state and regional approaches to land use and development issues remain large, flexibility will be especially critical to the ability to coordinate policies and approaches.

Implications

Economic, social, and demographic forces of change seem likely to create patterns of travel demand which are substantially more auto-oriented than was the case in earlier decades, and may in fact produce demand patterns that are hard to serve even by auto. In particular, an older, more affluent population, increasingly located in the auto-oriented suburbs, will present quantitatively and qualitatively different demands for transport services from those of past decades. The ability to come to grips with these changes may well depend on how federal programs approach such matters as data collection and analysis, planning and forecasting.

At the same time, transportation's role in meeting environmental and energy objectives is likely to demand more attention than in the past. Concerns about congestion could lead to greater emphasis on transit alternatives, or could continue to focus on auto-oriented solutions. Air quality requirements and desires for increased mobility may complement or conflict with one another. Federal programs may make the difference in direction and effectiveness of the various initiatives.

Emerging transportation and land development policies also present conflicting signals. Greater private sector involvement in transport provision and finance, tied to private interest in enhancing land development potential, is possible, as is focused use of transportation/land use planning strategies to create markets in which transit can function more successfully. Yet some of the strategies currently being pursued may be counterproductive. For example, limiting densities to levels designed to preserve a moderate traffic level of service on existing streets and highways may also limit development to densities too low to support a high level of transit service.

From a transportation and land development perspective, perhaps the most important trends are suburban and exurban growth and pressures for congestion relief and traffic mitigation. Both trends present risks and opportunities for transportation. For example, the current style of suburban and exurban development tends to be low density and scattered, and as such is hard to serve with conventional transit. The deployment of conventional bus or rail transit in areas where demand does not justify such options could lead to worsening deficits and management problems which transit agencies can ill afford. Whether new styles of development could better support effective transportation services, transit or highway, or whether a broader array of transportation services could better serve suburban development patterns, will be a topic receiving increased attention.

Yet opportunities may result from these same land development patterns and concerns over congestion. Conditions may present the occasion to introduce a broader range of transportation services, with quality and costs matched to market segments and user characteristics; to tie transit provision to land development commitments that help create or strengthen markets; to participate in the coordination of land development, highway and transit provision, and other transportation policies (high-occupancy vehicle lanes, parking policies); and to involve the private sector and/or local governments in transportation provision and finance. Such opportunities also offer possibilities for introducing new technologies, new marketing directions, new operating styles, new management approaches.

The issue is whether the Surface Transportation Act will support such innovations or deter them. A reinvigorated surface transportation policy would support the following objectives:

- Efficient operation and management of existing transportation infrastructure and services -- highways, transit, access to air and water ports
- Development of the monitoring systems and investment programs needed to assure adequate maintenance of transportation facilities
- Putting both highway and transit programs on a sound financial footing, with sensible objectives for deployment and operation
- Provision of new facilities and services needed to support continuing growth and development at a reasonable level of service
- Management of transportation's environmental impacts and recognition of the interconnectedness of transportation, land use, and environmental quality
- Spearheading research into new transportation technologies which, in the medium to long run, may offer substantially improved opportunities for serving transportation needs.

For these initiatives to proceed, two needs must be met:

- First, adequate financing must be secured; and
- Second, institutional arrangements supportive of innovation must be developed.

While funding support obviously demands attention, support for new institutional arrangements and planning processes is equally critical. How can multi-modal transportation planning proceed if highway and transit planning, funding, and decision-making follow separate paths? How can broader social and environmental concerns be integrated into the transportation planning process if planning continues to be done in a business-as-usual fashion, with out-of-date data and tools developed decades ago for different purposes? How can new financing mechanisms be tested and new partnerships pursued, new technologies introduced? The risk is that the new act will continue funding restrictions and biases, limiting flexibility and failing to offer either the incentives or the guidance needed to foster a transition to truly multi-modal, coordinated, environmentally responsive and economically sound transportation.

Support for innovation and creativity in transportation planning, management and finance is needed if the challenges facing transportation in the 21st century are to be met. Reauthorization of the Surface Transportation Act could provide this support by recognizing that the changing nature of travel demand requires a broadening of perspective and approach. The urban-metropolitan planning process should be strengthened so that it can in fact support multi-modal planning and investment, coordinate transportation and land development activities, reconcile mobility and environmental objectives, and accommodate emerging technologies, investment strategies, and pricing policies. Opportunities and rewards should be offered for leadership for those states and metropolitan areas ready and willing to develop and test new approaches, which if successful could be transferred to other areas across the country. This will require both flexibility and leadership on the part of the federal government, as well, but the potential payoff should be substantial.

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BEFORE THE SENATE SUBCOMMITTEE ON
WATER RESOURCES, TRANSPORTATION AND INFRASTRUCTURE

HEARING RELATED TO
REAUTHORIZATION OF THE SURFACE TRANSPORTATION
AND UNIFORM RELOCATION ASSISTANCE ACT OF 1987

FEBRUARY 7, 1991

TESTIMONY OF
DR. WILLIAM P. O'HARE
BEFORE THE SENATE SUBCOMMITTEE ON WATER RESOURCES, TRANSPORTATION, AND INFRASTRUCTURE

HEARING RELATED TO REAUTHORIZATION OF THE SURFACE TRANSPORTATION AND UNIFORM RELOCATION ASSISTANCE ACT OF 1987

I would like to thank the members of the Senate Subcommittee on Water Resources, Transportation and Infrastructure for giving me the opportunity to present my views on demographic trends and America's transportation system. The population changes that are transforming our urban centers are closely linked to our transportation needs but the relationship has not been well studied. It is important to examine this relationship as we plan for the transportation system that will carry us into the 21st century. I am convinced that several demographic trends have been instrumental in shaping the transportation system we have today and they will continue to be a force throughout the 1990s.

Demographic Change and the U.S. Transportation System

Our transportation system is a vital part of our society. Nearly one of every five dollars spent on goods and services in our economy -- equivalent to 18 percent of America's gross national product -- is spent on transportation products and services.[1] We spend more each year on transportation[2] than we spend on food.

Roads, streets, highways, and bridges provide personal mobility for our citizenry and allow efficient movement of goods which is vitally important for the business sector and therefore are a key to our international competitiveness.

The demand for new streets, roads and highways has grown dramatically over the last few decades, stimulated, in part, by population growth and demographic trends such as migration to the sunbelt, suburbanization of the population and jobs, and increased female-labor force participation.

Between 1960 and 1988, the U.S. population grew by 37 percent while the number of registered vehicles in the country grew more than three times faster...132 percent. Since population growth has played only a minor role in the increase in the number of vehicles on the road, the fact that the rate of population growth will decline in the next decade is not likely to significantly reduce the number of new vehicles we can expect.

The tremendous increase in the number of registered vehicles during the past few decades has been spurred by baby-boomers moving into the driving-age population and the rapid increase in real income since the end of World War II which allowed more people to buy more cars.

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[1]. U.S. Department of Transportation, Moving America: New Directions, New Opportunities, Volume 1. Building The National Transportation Policy, July , 1989, P. 1

[2]. U.S. Department of Transportation, Moving America: New Directions, New Opportunities, Volume 1. Building The National Transportation Policy, July , 1989, P. 13.

In addition, the increased movement of women into the workforce has resulted in more people who have to move between a home and a workplace. The demands of child care and household tasks in addition to a job make an automobile a necessity for many of these women. These trends are likely to continue over the next decade, although the rate of increase may slow down.

Changing Patterns of Urban Development

Changes in the location of housing and jobs in urban areas are reshaping the types and location of transportation services needed by our society. The suburban rings around major cities are growing more rapidly in both jobs and people, than are central cities or rural areas. About 2/3 of all new jobs are emerging in the suburbs and these areas already house more people than central cities or rural areas.

Patterns of metropolitan growth tend to vary a little by geographic region as shown in Table 1. In the old metro areas of the Northeast and Midwest, central city populations declined over the past few decades, while the surrounding suburban areas grew. However, in the newer metro areas of the South and West, both city and suburban populations experienced growth, although the suburbs generally grew much more rapidly than the cities.

Due to this pattern of urban development lateral commuting, i.e. from a home in the suburbs to a job in the suburbs, is a much larger commuter flow than suburb to central city commuting. Furthermore, a great deal of commercial development is centered on major suburban thoroughfares. The beltways and shopping malls which ring our major cities have become the mainstreets of the 1980s.

Due to rapid population growth, many suburban communities have been hard-pressed to develop roads fast enough to keep pace with growing transportation needs and relatively sparsely settled suburbs do not make traditional mass transit systems economical. The lag in infrastructure investment during the 1970s and early 1980s, is at least partly responsible for the lack of adequate road systems in many rapidly developing suburban areas.

Numerous polls show that suburbanites perceive traffic congestion to be the top priority problem in their community[3]. In addition to personal inconvenience, travel delays in the nation's largest urbanized areas now cause an estimated 2 billion lost person-hour annually[4]. If those hours were valued at today's minimum wage it amounts to more than $8 billion a year in wasted time not to mention the costs of extra fuel consumption and environmental pollution.

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[3]. Background paper by Alan Pisarski prepared for the America in the 21st Century Project at the Population Reference Bureau.

[4]. Moving America New Directions and New Opportunities, U.S. Department of Transforation.

As suburbs continue to grow at the expense of central cities, the task of re-building the infrastructure of older cities becomes more difficult. The task is aggravated by the fact that many of these cities postponed needed maintenance on infrastructure facilities in the 1970s, because they were financially hardpressed. Some observers feel that investment in infrastructure is needed to spur economic development in these older urban centers, but the loss of population and businesses has eroded the tax base needed to maintain public facilities and build new transportation systems.

Recent urban development trends also raise questions about how low-income minorities living in central cities can gain access to the emerging jobs in the suburbs. The movement of jobs to the suburbs is particularly problematic for those who do not have access to a vehicle. In 1980, nearly 40 percent of all black households in central cities reported that they had no vehicle available. While lack of public transportation from inner city neighborhoods to suburban job sites can explain only a fraction of the high unemployment rate of inner-city blacks, this issue will become more important as more jobs move to the suburbs.

The lack of mobility among inner city residents has important consequences for the central cities where these individuals live as well as for the suburban businesses that are already feeling a labor shortage in many areas. In some cases, labor shortages in suburban areas have prompted employers to develop their own transportation strategies such as the provision of private jitney service.

Major cities that have large black populations also tend to be among those worst hit by out-migration during the 1980s. Table 2 shows that among the ten large (100,000+) cities with a black population majority in 1980, all but one (Inglewood, California) lost population during the 1980s. Since the fiscal burden of building and maintaining public infrastructure is being shifted to local jurisdictions (53% of costs were from local governments in 1987 compared to 41% in 1960), the loss of population and economic vitality in these communities make it doubly difficult for city government to maintain streets and public transportation systems.

Demographic shifts are also linked to the future of rural roadways. The vast majority (82 percent) of our roads are located in rural areas, but only 27 percent of our population live outside of metro areas, down from 44 percent in 1950.[8] Although many of these roads are used by inter-city travelers it appears that a lot of public funds are spent to maintain roads in areas which house increasingly fewer of our citizens. This dilemma is compounded by the fact that many small rural towns are losing population and there is almost no public transportation in rural areas.

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[8]. U.S. Statistical Abstract 1989, Table 32,

Shifting Commuting Patterns

Problems caused by the lack of adequate streets and roads are intensified by increased reliance on solo commuting. The share of workers driving alone is going up (72 percent in 1985 up from 65 percent in 1975) while the share of workers car pooling or using public transportation is going down (19 percent in 1985 down from 25 percent in 1975). As jobs become more scattered in the suburban ring, these commuting trends are likely to continue and bring increased traffic congestion in suburban areas. This will undoubtedly put pressure on governments to build more roads or find alternative means of transportation.

The average worktrip grew from 8.5 miles in 1975 to 10.7 miles in 1985, but the time needed to make the trip was nearly the same in both years (about 20 minutes). One of the reasons that the time needed for the worktrip has remained steady even though the length of the worktrip has increased is the shift from less rapid modes of transportation like public transit or carpooling to more rapid modes like driving alone to work. Also, more people are living and working in suburban areas where worktrip speeds are higher than in central cities. However, as population in suburban areas becomes more dense the congestion caused by a large number of commuters driving alone, may lead to slower commuting speeds.

Some observers speculate that the shift from a manufacturing to a service economy combined with advances in computers and telecommunications will make the trip from home to work less important than it was in the past because more people will be able to work at home. While these changes may have some impact in the 1990s, the impact is slow in coming. The share of people working at home (3 percent) did not change between 1975 and 1985. In fact many jobs where people typically work at home (i.e, farming and small-town family physician) are declining.

The opportunity to drive alone to work provides enormous personal mobility, but it requires more investments in roads, contributes to environmental problems, and increases our dependence on foreign oil. Policy-makers have to examine the costs and benefits of this preferred mode of transportation closely to determine appropriate policies.

Changing Age Structure

Shifts in our population age structure may also have subtle impacts on the demand for transportation services over the next few decades. As the number of older drivers who are unable or unwilling to drive increases, special provisions and new types of transportation options may be necessary to accommodate this politically powerful population. This may become particularly important around 2010 when the large baby-boom generation begins to retire.

Data from the 1980 Census indicate that workers age 65 and older were 50 percent more likely than younger workers to use public transit[6], however, it is not clear that the elderly of the 21st century will be as likely to use public transit as the elderly of 1980. Women make up a disproportionate share of the elderly and many of today's older women grew up in a time when women were discouraged from driving. For most groups under age 50, women are just as likely as men to have a driver license.

The 1990s may offer a window of opportunity to catch up on transportation infrastructure spending since the number of person reaching driving age will fall slightly. But this trend will be partly offset by the fact that a much higher share of teenagers have their own car now than was the case a decade ago. The share of teenagers of driving age who own a car rose from 13 percent in 1978 to 35 percent in 1988.[7] If a large share of young people become accustomed to having an automobile at their disposal for work and other activity it may be more difficult to persuade them to use public transportation later in their lives.

Mass Transportation

Several metropolitan areas (Miami, Detroit, Los Angeles, and Portland, for example) have attempted to ease traffic congestion by investing in mass transit systems during the 1980s. However, these new systems have required enormous financial investments (which were usually much higher than initial estimates) and the results in terms of overall ridership and reduction of auto traffic have been disappointing.

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[6] Demographic Change and Recent Worktrip Travel Trends, Vol. 1 - Final Report, Prepared by William O'Hare, Joint Center for Political Studies, Feb. 1985.

[7] American Demographics Vol. 11, No.7, July 1989, page 8, citing Rand Youth Poll, 1988

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In general, use of public transportation has declined steadily over the last few decades. For example, in 1960 almost 13 percent of workers used public transportation for the worktrip, but that figure fell to 9 percent in 1970 and then to 6 percent in 1980. The most recent data available, show only 5 percent of workers used public transportation for the worktrip in 1985.[8]

If traffic congestion and travel delays become more widespread and problematic in the 1990s, Americans may reconsider their preference for private autos over public transportation. However, the suburban sprawl that has developed in many large metropolitan areas will require new kinds of public transportation systems that move away from the orientation of traditional systems which are only economical in densely populated areas. Fixed-route fixed-schedule public transportation systems may have to give way to more flexible systems.

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[8]. O'Hare, William , 1985, Demographic Change and Worktrip Travel Trends, Urban Mass Transportation Assistance Program.

Summary

While the trends outlined above suggest an increased demand for auto-based transportation in the 1990s, our ability to meet these demands may be constrained by the cost of building new roads and concerns about the environmental impact of autos. Air quality problems in many areas such as Los Angeles are already leading to measures to restrict auto travel. If the cost of oil were to increase dramatically as it did twice in the 1970s, the country would undoubtedly look at alternatives to automobile-center transportation. However, the longer current patterns of urban development continue the more difficult it will be to make alternative transportation systems workable.

For many public officials, the 1990s will require a policy balancing act which attempts to simultaneously cut reliance on automobiles, increase use of collective transportation, and at the same time build, expand and maintain the roads that will be absolutely necessary.

Table 1. City and Suburban Growth in Largest U.S. Metropolitan Areas: 1960-1988

(figures in 1,000s)

	Population	change in population 1960-88		
	1988	Total	City	Suburbs
New York	18,120	7,425	-429	7,854
Los Angeles	13,770	7,731	874	6,857
Chicago	8,181	1,960	-572	2,532
San Francisco	6,042	3,393	-8	3,401
Philadelphia	5,963	1,620	-356	1,976
Detroit	4,620	858	-634	1,492
Boston	4,110	1,001	-119	1,120
Dallas/Fort Worth	3,766	2,647	307	2,340
Washington, D.C.	3,734	1,670	-147	1,817
Houston	3,642	2,224	760	1,464
Miami	3,001	2,066	79	1,987
Cleveland	2,769	860	-355	1,215
St. Louis	2,467	362	-346	708
San Diego	2,370	1,337	497	840
Phoenix	2,030	1,366	485	881

Source: U.S. Bureau, Current Population Reports, Series P-26

Table 2. Population Change During the 1980s in Large Cities with Black Population Majorities

City	Percent Black in 1980	Population Change 1980-90 Number	Percent
Atlanta	66.6	-31,005	-7.3
Baltimore	54.8	-50,727	-6.4
Birmingham	55.6	-18,445	-6.5
Detroit	63.1	-175,394	-14.6
Gary	70.8	-35,322	-23.2
Inglewood	57.3	15,440	+16.4
Newark	58.2	-54,027	-16.4
New Orleans	55.3	-60,989	-10.9
Richmond	51.3	-16,158	-7.4
Washington,D.C.	70.3	-31,532	-4.9

TESTIMONY
OF
ALAN E. PISARSKI

ON

DEMOGRAPHIC TRENDS AND TRANSPORTATION DEMAND

PREPARED FOR THE

UNITED STATES SENATE

SUBCOMMITTEE ON

WATER RESOURCES, TRANSPORTATION AND INFRASTRUCTURE

OF THE

ENVIRONMENT AND PUBLIC WORKS COMMITTEE

FEBRUARY 7, 1991

INTRODUCTION

A few years ago ten major public interest associations * asked me to undertake an examination of commuting trends called "Commuting in America." That study identified and described the trends that dominated commuting patterns and other urban travel patterns in the seventies and into the eighties. Those patterns included dramatic increases in:

- Total commuters due to:
  - the baby boomers coming of working age
  - the arrival of women workers in the labor force
- Auto travel due to:
  - increases in auto availability
  - a decline in transit and other auto alternatives
- and a shift to suburban job destinations due to:
  - population shifts to the suburbs
  - high costs and congestion in city centers

This testimony examines those patterns to see how they will affect commuting and the nation in the nineties. It treats the questions: Will these patterns persist or fade? Will new forces of change develop? Will new patterns emerge?

The new data collected last Spring by the Bureau of the Census will be the definitive source on this subject, and the transportation community is gearing up to make the best possible use of that information when it becomes available. When available the census will provide the best picture ever on the commuter. But that's not for at least two years. For now we must use what we have from a set of partial sources and speculate a little on the expected trends. The following then are my thoughts on what the census will tell us about ourselves when its finally available. Some of these predictions are more certain than others. Some are very much open to conjecture.

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*
AASHTO - AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANS OFFICIALS

HUFSAM - HIGHWAY USERS FEDERATION FOR SAFETY AND MOBILITY

ITE - INSTITUTE OF OF TRANSPORTATION ENGINEERS

NACO - NATIONAL ASSOCIATION OF COUNTIES

NARC - NATIONAL ASSOCIATION OF REGIONAL COUNCILS

NCSL - NATIONAL CONFERENCE OF STATE LEGISLATURES

NGA - NATIONAL GOVERNORS' ASSOCIATION

NLC - NATIONAL LEAGUE OF CITIES

USCM- U.S CONFERENCE OF MAYORS

ULI - URBAN LAND INSTITUTE

THE BASIC TRENDS

- We do know that we have about 10 percent more people today than in 1980, roughly 250 million vs. 226 million in 1980. But examination of that change reveals an important trend. It shows that we added fewer people in the eighties than in the seventies, which was even fewer than we added in the sixties - and we will add even fewer in the nineties. This includes expected immigration as well as natural increase.

- The 1990 Census data will reveal that we had close to 120 million employed early in the year, which will mean about 48 percent of our population is employed in contrast to 42 percent for the 96 million employed, in 1980 - about a 25 percent increase in those employed in ten years.

- Focusing on that for a moment emphasizes the point that meant 24 million new workers, and new commuters in a decade. Of that 24 million, only 9 million was due to population increase and the remaining 15 million was due to the changing character of the population. that is, we have 15 million more commuters than we would have had if 1980 characteristics of the population still pertained to today's population. In support of that point, of the 24 million new employed roughly about 60 percent were women.

- But the big labor force gains of the seventies and early eighties are over. The nineties will show even a slower growth in the labor force. Parenthetically, the slowing of new entrants into the labor force has helped the current unemployment statistics - with the rate of job creation this year we would have unemployment near the 8 or even 9 percent range with past labor force growth patterns.

- Our thesis is that the great boom in workers is just about over and constitutes a bubble that we are on the downside of - not because of an economic slowdown in the economy - but because of dramatic changes in the demography of the nation.

- These changes in the population are most vividly seen if we look at the changes by age group in the eighties. The big growth in percentage terms in the eighties was in those already of working age (The baby-boomers, the last of whom got into the labor market in the early eighties). They were the cause of the boom in workers and in commuting we are now so heavily affected by. Also there was an exceptional percentage growth in those over 65.

- The major news for the decade was the sharp decline of 12% in the 18-24 year age group in the eighties. (from 30 million in 1980 to approximately 26 million in 1989.) These are our new drivers; our first-time car buyers; our new truck drivers, etc. They are our new labor force generation. Right behind them the 5-17 year age group also showed a percentage decline, of 4.4 percent. In absolute terms only four states, Alaska, Arizona, Florida and Nevada, have more 18-24 year olds now than in 1980. The declines in this age group were heaviest in the midwest - Iowa, the Dakotas and Kansas, for example.

- Looking at the nineties we can see that patterns progress. We will see an aging labor force and even fewer new entrants in the 18-24 age group. The heavy shift to middle-age groups, depicts a population with the means and time to travel, a strong travel and tourism growth market, but with special needs and problems. The big change comes when the baby boomers start to hit 65, around the year 2010.

- A big factor in the job entrant age group issue in the nineties will be immigration. About seven million of the added population in the eighties were from net immigration, These new arrivals are heavily in the younger age groups (with 90 percent below 35 and 60 percent between 15 and 35 years), suggesting that our new work force entrants will be disproportionately immingrant populations. The emphasis on skills as a criterion for entry in the new immigration legislation apparently recognized this. It will increase potential immigration by as much as 1.5 million in the nineties in needed skills areas. This suggests that immigration is an area of potential flexibility to meet future labor requirements.

- One of the big factors in commuting trends and overall local travel patterns has been the shift of homes and jobs to the suburbs. That pattern continued through the eighties and will continue into the nineties - two/thirds of new population went to the suburbs in the eighties. But the impact of these trends will not be as dramatic as in the past. At present rates of growth the suburb's present share of total national population of 45 percent, will only shift to 48 percent by the year 2000. Another factor is that the gap in growth rates between suburbs and center cities has narrowed, particularly in the west, although suburban growth rates are still more than double central city rates.

- If we look more closely at metropolitan growth trends we will see that the trend is still toward the large metropolitan areas of the nation. Examination of annual growth rates in metropolitan areas by size class shows that all metro area groups were near the national average of about 1% per year, but the largest group, above 5 million population, and the smallest, below 250,000, were lowest in growth, (.97 and 1.03 respectively) It was the metropolitan areas from 250,000 up to 5 million that grew most rapidly,ie, significantly above the national average. (1.23% for areas of 1-5 million; and 1.17% for areas of 250,000 to 1 million.)

- In non-metropolitan counties only those on the edge of metropolitan areas grew faster than the national average. Those with over 15% commuting to the center grew at 1.21% per year, while growth decreased with distance from metropolitan centers, as measured by commuting to the center. Areas with under 5% commuting to a metropolitan center grew at less than half the national rate, .42% per year. really the extension of suburban development, the candidate areas for new metropolitan suburbs. These trends are emphatic but less pronounced than in the seventies. These fringe growth areas will add to metropolitan area size and scale in the 90's.

- One trend that has strongly affected national travel demand patterns has been the shift of population to the south and the west. Over 90 percent of national growth occurred in the south and the west between 1980 and 1986. This extreme trend of 91 percent of national growth going to the south and west has show signs of moderating and moving toward a more balanced pattern. It has been closer to 80 percent since 1985.

- A signficant message to be drawn from regional trends is that any apparent shift in the balance of growth back to the central cities seen in national trends is a product of the patterns in the south and the west - much of it due to annexations and large central city boundaries. All of the population increase in the Northeast and the Midwest has been in the suburbs. In the Northeast the suburbs grew by 2.5% from 1980 to 1986 as the center cities declined by .1%. The Midwest showed a similar pattern of 3.2% growth in suburban population and a decline of 1.4% in central cities. (The West and South the patterns were: 14.5% and 15.4% respectively in suburbs; and 11.5% and 8.3% respectively in central cities.)

MODAL SHARE TRENDS

- The shift to the automobile continued in the eighties. For the most part this consisted of the decline in all of the alternatives to the automobile. For 1990 we can estimate that the three main options: working at home; walking to work; and transit will each have reached some kind of minimum base level.

- If those who work at home, about three million commuters, and those who walk to work, probably around four to five million, are subtracted we reduce total commuting by from six to eight million representing those who don't use vehicles to get to work, leaving about 112-114 million commuters from the original 120 million. The remainder of vehicle-based commuters represents about a 27-29 percent increase over 1980.

- One category that may have bottomed-out and begun possible growth in absolute, if not in percentage terms, is the working at home phenomenon. This upturn has long been predicted based on believes in computer-generated opportunities. A clue to this potential is that non-agricultural self-employment grew by 17% in the eighties to over eight million workers. Based on the occupational mix of these workers many would have the potential to work at home.

- Based on current ridership data no more than about six million commuters are transit users, roughly the same number as in 1980, equivalent to about five percent of commuting. Subtracting the transit users leaves between 106 and 108 million auto commuters - certainly a maximum of 110 million commuters - about a 30-35% increase over 1980.

- All of this sums to a slight shift upward in overall auto share from roughly 84 % in 1980 to above 86% in 1990. However, if preliminary data available from the American Housing Survey conducted by the Bureau of the Census are an accurate guide the composition of auto travel changed drastically. These new data, tending to be corroborated by anecdotal information around the country, depict a shift in ridesharing from about 20 percent of auto users to about 14 percent. All of those shifting out of rideshareing going into single occupant vehicles. If this is true, and one might hope it isn't, it would indicate almost a 50 percent increase in single occupant vehicles on the road since 1980. At the same time group riding would hold constant at about 15 to 16 million riders. This would mean a dramatic decline in average auto occupancies from 1.15 per vehicle to 1.10; and further imply that there are about 100 million commuter vehicles on the road on a typical day.

- Reviewing this in geographic terms suggests that the percentage increases will be far greater in the suburbs of our metropolitan areas over a million in population, particularly in the South and West. But even Northeastern and Midwestern cities that exhibited little or no growth will show substantial increases in auto commuters in their suburbs.

OTHER TRAVEL

- The topic of commuting needs to be put in perspective for the present discussion and for the future. The actual share of metropolitan travel attributable to commuting is small and declining. A bit more than 30 percent of all metropolitan travel is commuting, and even in the peak periods only about 55 percent of morning peak period travel and 37 percent of evening peak period travel is work travel. Our congestion problems are related to much more than just commuting. This trend of declining significance for commuting continues. A number of factors are at play here: More part time workers, about 20 million, 2-job holders, about 6 million, and the shift to services, with its emphasis on evening and weekend employment, all tend to reduce work travel in the peaks. Recent data indicate that no single hour accounts for more than 30 percent of work travel.

TRIP LENGTH AND TRAVEL TIME CHANGES

- From the Census we will only learn something indirectly about average work trip lengths, but no direct measurement will be available. Average trip length will be the product of the interaction of two opposing trends. Average trip lengths should be getting shorter as suburb to suburb trips substitute for longer suburbs to center city travel. But this could be overwhelmed by the general centrifugal effects acting on metropolitan patterns.

- Trip lengths and average speeds are tied together. It is clear that congestion has substantially decreased average speeds everywhere, whether in the central cities or suburbs. But, given shifts to the suburbs where average speeds are still better than in central areas; and the shifts to the single occupant auto as commuters seek to improve their travel times over the slower modes -walking, transit, car pooling, etc. it is possible that the seeming anomoly of shorter average commuting times may be reported for 1990 compared to the 21.7 minutes 1980.

- The safer forecast is that all commuting patterns, modally and geographically are sliding toward what could be termed "the Black Hole" of commuting - the single occupant vehicle in a suburb to suburb trip - people, very rationally are shifting their behavior toward the shortest travel time and most convenient commute.

- To summarize the commuting changes we expect The Census data will portray:

POPULATION UP 10 PERCENT
WORKERS UP TO 25 PERCENT
COMMUTERS UP 27-29 PERCENT
AUTO COMMUTERS UP 30-35 PERCENT
VEHICLES IN USE IN COMMUTING UP 40-42 PERCENT
SINGLE OCCUPANT COMMUTING UP 45-50 PERCENT

THESE EVENTS WERE EXTREME AND THE FORCES DRIVING THEM ARE ALREADY CHANGING.

Many of the these trends seem to indicate dramatic growth. But in fact in most cases they represent extreme redistributions of past patterns rather than growth itself. Although for communities subjected to a vast influx of new commuters, it is irrelevant whether the cause is called growth or redistribution.

- These events were extreme and the forces driving them are already changing. In the nineties we will see a softening of almost all the forces that made for these extreme events. This will make travel demand swings less dramatic and make for a more operable array of problems to deal with. Among the softening trends are these:

- The boom in workers is over. Typically we will see one million new workers per year added to the labor force, rather than the 2.5 million per year true in the seventies and eighties. In 1990 new entrants into the labor force have been almost nonexistant. Similarly the influx of women into the labor force has slowed. Our concern in the future will be for too few workers rather than for too many. In 1990 the increase in young workers that typically occurs each summer was the lowest in 26 years.

- The shift to the auto for commmuting is about complete - fundamentally there is nothing left to change over. Walking and Work-at-Home are close to their base levels, there may even be signs that work at home may finally begin to increase as so often predicted in the past.

- Possession of driver's licenses among adults is at saturation. Auto ownership has reached "effective saturation" in that vehicles now exceed the number of drivers. For commuting purposes there are about 1.5 vehicles per worker in the nation.

- The drop in household sizes and the concomitant declining rate of growth in households, which tend to increase travel demand, has slowed.

- The surge to the South and the West is softening. About 80 percent of growth is now going to these areas in contrast to over 90 percent in the early eighties. The tendency to migrate across country, which is a characteristic of the young adult, should weaken as their numbers decline.

- Suburbanization will continue as families shift to the edges of our metroplitan regions search for lower cost living space and escape from congestion, but the changes will not cause the big swings in population engendered in the past. There is some indication of a shift to smaller metropolitan areas.

WHAT DOES ALL THIS ADD TO ?

We can begin to see that what we have lived thru has been a bubble that we are nearing the end of - It was ludicrous that we failed to see it coming - It would be even more ludicrous if we assumed that the rates of change of the past bubble were now permanent and the base for future growth. Clearly they are not.

ALL OF THIS ARGUES FOR 2 THINGS -

IT WOULD BE ERROR TO BASE CURRENT PUBLIC OR PRIVATE POLICIES ON AN EXPECTATION OF A CONTINUATION OF THE EXTREME PATTERNS OF THE 70'S AND 80'S.

OUR "POST-BUBBLE" PROBLEMS ARE STILL DIFFICULT BUT TRACTABLE. IN LARGE PART THEY INVOLVE THE NEED FOR RESPONSE TO THE ONE TIME DEMAND SHIFTS OF THE PAST DECADE AND A COURSE OF ACTION DIRECTED TO THE NEEDS OF THE NEW PATTERNS THAT ARE EMERGING.

SUMMARY DATA

1. POPULATION BY AGE 1980, 1989

	1980	1989	
UNDER 5	16	19	
5-17	47	45	
18-24	30	26	
25-44	63	80	[25-34 = 43; 35-44 36]
45-64	44	47	
65+	26	31	
TOTAL	.226	248	MILLION

CENSUS SERIES P-25, 1058

2. ANNUAL RATES OF POPULATION CHANGE BY METRO AREA SIZE 1980-1987*

OVER 5 MILLION	.97
1-5 MILLION	1.23
250,000 - 1 MILL.	1.17
UNDER 250,000	1.03

3. ANNUAL RATES OF POPULATION CHANGE BY RURAL AREA 1980-1987*
BASED IN COMMUTING SHARES TO METRO AREAS

OVER 15%	1.21
10-14%	.78
5-9%	.63
UNDER 5%	.42

* NATIONAL AVERAGE FOR PERIOD .99

4. PERCENT CHANGE IN POPULATION IN SUBURBS AND CENTERS BY REGION 1980-1986

	SUBURBS	CENTER CITIES	TOTAL METRO
NORTHEAST	2.5	- .1	1.7
MIDWEST	3.2	- 1.4	1.2
SOUTH	15.4	8.3	12.3
WEST	14.5	11.5	13.3

COMMUTING

5. TOTAL WORKERS

1980 TOTAL WORKERS 96 MILLION

1990 TOTAL WORKERS 120 MILLION [EST.]

6. ESTIMATED COMMUTING PATTERNS 1990

	1980	1990 (EST)
AUTO	84.1	86.
SOV	(64)	(72)
GROUP	(20)	(14)
TRANSIT	6.3	5
WALK	5.6	4
WORK HOME	2.3	3
OTHER	1.7	2.

7. ESTIMATED VEHICLES IN USE

APPROXIMATELY 100 MILLION
90 MEG SOVS + 7-8 MOVS = 97-98 MILLION VEHICLES
= 106 MEG PEOPLE @ 1.1 PERS/VEH

8. TOTAL COMMUTERS BY MODE TO WORK 1990 (ROUNDED EST.)

120 MILLION COMMUTERS
106 MILLION IN AUTOS
6 MILLION IN TRANSIT
5 MILLION WALK TO WORK
3 MILLION WORK AT HOME

DEMOGRAPHICS AND THE DEMAND FOR TRANSPORTATION

Testimony Presented to the
Water Resources, Transportation, and Infrastructure Subcommittee
of the Senate Committee on Environment and Public Works

February 7, 1991

By William B. Johnston

Senior Research Fellow
The Hudson Institute

Mr. Chairman and members of the Committee.

Good Morning. I am William Johnston, a Senior Research Fellow at the Hudson Institute. I am pleased to have the opportunity to comment on the impact that demographic trends are having on the demand for transportation in the United States.

The demographic facts that are shaping America's future are so well known, and so often analyzed that discussion of them can sometimes seem self-evident or trivial. But as obvious as the facts are, their implications have not yet been fully appreciated nor fully incorporated into national transportation policies. I would like to review briefly the most important demographic facts, and their direct implications, and then to draw several general conclusions from the data.

The Demographic Trends

In the 1990s, five demographic trends are most important for transportation planning:

- America's population will be increasing relatively slowly compared the growth of the last few decades, despite relatively high levels of immigration.
- The average age of the population will be rising rapidly throughout the next several decades, because of low birth rates, longer lifespans and the aging of the baby boom generation.
- Most of the nation's growth will occur in the South and West, while the number of people in the Midwest and Northeast will barely grow at all.

- An increasing share of the country's population will live in large, low-density cities dependent on automobiles.
- A growing majority of women in all types of family circumstances will hold jobs in the paid workforce.

Slow Growth

The sudden end of the baby boom in the early 1960s signaled a return to the long term pattern of a slowing rate of population growth in the United States and other advanced industrial nations. From a birth rate that had reached 3.7 children per woman in the late 1950s, the rate fell steadily to today's 1.8. As this new pattern of fertility emerged, the nation's rate of population growth plummeted from 3 percent per year in the 1960s to 1 percent annually in the 1980s. In the next two decades it is projected to decline even more. (See Table 1)

The slowdown comes despite an increase in the numbers of immigrants, and the relatively higher fertility rates of immigrants and minorities. Throughout the 1970s and early 1980s, some 450,000 legal immigrants per year have entered the United States, and immigrants and their children are expected to account for some 42 percent of the nation's net population growth over the next 20 years.

The slower growth of the nation's population will have several important implications for its transportation system. First, slower

TABLE I

U.S. POPULATION GROWTH IS SLOWING

	1950	1960	1970	1980	1990	2000	2010
Population (Millions)	151.3	179.3	203.3	226.5	249.9	267.7	282.6
Annual Growth Rate (Compared to Previous Decade)		1.8%	1.3%	1.1%	1.0%	0.7%	0.5%

Source: U.S. Bureau of the Census, Series P-25 No. 1017.

population growth means that economic growth will be slower, and that there will be somewhat less need for major new investments in transportation infrastructure. While new construction will be needed to respond to shifts in patterns of urban or regional development, the massive investments in interstates, airports, and rolling stock that were undertaken in the 1950s and 1960s need not be repeated. A slow growing population will provide some breathing room compared to the rapid historical pace of transportation demand growth.

Second, as economic growth slows down, the pattern of economic activity will change as well. The economy is gradually moving away from its emphasis on increasing goods production toward selling higher value goods, and more services. The U.S. economy is already dominated by service industries and is continuing to shift toward service employment. This pattern is characteristic of all the world's developed nations. Currently some 70 percent of all jobs and 75 percent of total economic value is created outside the goods producing industries. But the year 2000, these shares are expected to rise another 5 percentage points.

Because of this shift, the demand for freight transportation may not keep pace with the growth of the rest of the economy. In an economy in which the numbers of people and households are growing slowly and some households are growing wealthier, many industries seeking growth will switch their attention from selling one widget to each person, and focus instead on selling services or upscale products to higher income groups. Since transportation is a small component of most services and usually represents a smaller fraction of the cost of expensive goods compared to its fraction of the costs of cheaper ones, demand for moving goods is likely to grow more slowly than overall GNP.

Another way to characterize the change is to say that the economy is becoming much "lighter" as a result of its structural shifts. That is, the economy will continue to require fewer tons of steel, or lumber or even aluminum per dollar of GNP throughout the next several decades, compared to its historical pattern. As this shift takes place, products of all kinds will tend to be composed of more "information" and less weight or bulk. Consumers are gradually buying more sizzle and less steak in many industries: cars and computers are lighter, plastic packages are replacing glass, fashion or brand name goods are replacing generic ones; intangible services such as education and health care make up rapidly growing fractions of the economy.

An increasing share of the value of goods such as these is created by the advertising and communications industries, rather than by the manufacturing process or by transportation of physical bulk. Transportation, which until a century ago was the only mechanism of communication, is now being partly replaced by communication in many products. As a result of these shifts, freight transportation will grow more slowly than the economy as a whole, especially basic freight transport services that simply move tons or boxes from point to point.

On the other hand, as the gross transported weight or bulk declines, the value of transported products increases per unit of weight or size. This will place a higher premium on speed, safety and reliability. One way to think of this is to note that high value goods have the highest inventory carrying costs, and people are the highest value goods of all. Transportation services will shift to modes and systems that offer speed and service, and companies that offer these high quality services will grow more rapidly than those that do not.

An Aging Population

As the baby boom ages, and the numbers of young people decline as a result of lower birth rates, the average age of the population will rise substantially over the next several decades. By the year 2010, the nation's population will the oldest it has ever been, with an average age of 38 compared to 30 in 1980. The numbers of young people will decline both absolutely and relative to other age groups, while the numbers of people older than 45 will grow dramatically. (See Table 2) It is important to remember that while this trend has been accelerated by the aging of the baby boom, that the shift to an older society is not a temporary trend but a permanent shift. The aging of the country will continue for many decades into the next century.

The "aging of America" will affect the demand for transportation. As more people reach retirement or near-retirement ages, they are likely to save more, to enjoy more discretionary income and to have more leisure time. This will increase the market for vacation and resort travel, and tend to accelerate the growth of the personal travel market. Travel during leisure time is more dispersed in both time and space. That is, unlike commuting, leisure travel tends to occur more on weekends, and to be directed to and from relatively remote resorts and second home sites. Although travel of this sort does engender congestion, it is less concentrated than that associated with journeys-to-work. On the other hand, to the extent that many holiday areas are in rural or undeveloped areas, the new demands for leisure travel may require some new infrastructure construction.

TABLE 2

AMERICA IS BECOMING MORE MIDDLE-AGED

	1970	1980	1990	2000	2010
Share of Population					
Over Age 65	10.5%	12.3%	14.1%	14.8%	16.1%
Over Age 45	31.0	31.8	32.9	38.2	45.0
Under Age 24	46.2	39.8	35.6	32.8	29.9

Source: U.S. Bureau of the Census, Series P-25, # 952, Table F.

Population Growth In the South and West

The shift to the South and West that has been underway throughout this century will continue for the foreseeable future, with the greatest growth occurring on the Pacific Coast, along the South Atlantic, and in the Southwest Mountain States. Between 1986 and 2010, for example, the population of the South Atlantic will grow by 14 million, and the West will gain 17 million, while the Northeast will gain only 2.4 million and the Midwest will actually lose some 300,000 people. (See Table 3)

Because these trends are being driven by powerful forces such as immigration, and rates of family formation they are not likely to change in the 1990s. For example, of the approximately 12.5 million new immigrants the Census Bureau expects to arrive between now and 2010, some two thirds are expected to locate in the West and South. Similarly, because there are more young families in the South and West who have been transplanted from other areas, more children will be born in these regions in the 1990s, compared to the numbers in the North and East. In the Midwest, for example, the number of people aged 18-24 will drop from 6.8 million in 1986 to 5.5 million in 2000; during the same period, the West's population of this age will grow from 5.5 million to 5.8 million. The children of these young people will create a self-reinforcing pattern of population growth in the West that will not occur in the Midwest.

These regional population dynamics obviously have major implications for transportation demand. Transportation systems are markedly different in areas that have enjoyed many years of growth in an economy dominated by highway transportation systems. The multi-centered, highly dispersed home and worksite model characteristic of western and southern cities has permanently changed the nature of their transportation needs, making them

TABLE 3

THE SOUTH AND WEST HOLD A GROWING SHARE OF THE U.S. POPULATION

	1950	1970	1990	2010
UNITED STATES	100%	100%	100%	100%
Northeast	26.1	24.1	20.2	18.6
Midwest	29.4	27.8	23.9	20.9
South	31.2	30.9	34.9	37.2
West	13.3	17.1	20.9	23.3

Source: U.S. Bureau of the Census, Series P-25, #875 & 1017.

all but impossible to serve with anything but trucks and personal vehicles. Although cars have forced changes on older eastern cities as well, these changes have been much more marginal, simply because so much of the basic infrastructure was oriented toward rail systems and heavy industry, and was constructed before automobiles.

Accordingly, the investment challenges, and the opportunities for employing new technologies are quite different in different parts of the country. Obviously, the areas of the country with little or no absolute growth have more limited opportunities to develop new infrastructure, while those in growing regions face a hectic race to accommodate growth. Older cities must still find ways to rebuild and change their transportation networks, while those in other areas have more opportunity to design "greenfield" systems. New infrastructure such as airports and highways may be more feasible in the less densely populated regions where new growth is occurring. The most important public policy implication of these differences is the need for greater flexibility in resource allocation decisions. Although many federal programs presume that each region has similar transportation needs, this is hardly the case. New funding mechanisms need to recognize these increasingly divergent needs.

Metropolitan Growth

The 1980s have seen a return to the nation's long term pattern of more rapid growth in metropolitan areas, following a temporary reversal of this trend during the 1970s. Between 1980 and 1986, for example, metropolitan counties gained population at the rate of about 1.1 percent per year, while nonmetropolitan counties adjacent to metro areas added only .8 percent annually, and counties not adjacent to metro areas grew less than .5 percent. In the midwest, these non-adjacent counties were actually losing population. Some 77 percent of the nation's population now lives in metropolitan areas, up from 63 percent in 1960. The largest absolute growth has taken place in metropolitan areas larger than 1 million, which added 7.5 million residents between 1980 and 1986.

Within metropolitan areas, the suburban periphery has enjoyed by far the greatest growth of both population and jobs. Since 1950, the suburbs have captured more than four fifths of all new residents, and three fourths of all new jobs in metro areas, so that suburbia now accounts for 44% of all population and 47% of all jobs in metropolitan areas. Shopping has also shifted rapidly to the suburbs, with the majority of all retail space now located outside the urban core.

This process of suburbanization, coupled with the faster growth in the sprawling cities of the South and West, has caused the average density of urban areas to decline substantially over the past several decades. Between 1970 and 1985, for example, the average population density of large (greater than 100,000 population) cities dropped from almost 5,500 people per square mile to only 3,500 per square mile.

As a result of the trends in the locations of homes, offices and shopping malls, most metropolitan areas are now geographically large systems with multi-directional traffic flows between many destination nodes. This pattern, coupled with low density which makes most mass transit systems uneconomic, has led to a boom in automobile use. Autos now account for 85 percent of all commuting, and most households now have more vehicles than workers. Utilization of every other method of transportation for commuting has declined over the past three decades, and this pattern seems to hold true for virtually every type and size of city.

Dispersed metropolitan growth obviously has profound implications for future transportation demands. The country has become ever more tied to its personal, on-demand, point-to-point transportation system: automobiles. Despite oil shortages and price increases, the lamentations of many environmentalists and urban planners, and multi-billion dollar federal investments in urban transit, nothing has dented the dominance of the automobile.

For the foreseeable future, the main challenge for transportation planners will continue to be to accommodate to, manage, and build for the automobile. In new or growing metropolitan areas this task will include not only engineering on new rights-of-way but also relief of traffic bottlenecks that spring up as new shopping malls, airports or office parks are developed. In the aging urban areas, the decades long struggle to find environmentally acceptable ways in which to reengineer urban systems to accommodate the greater space requirements of automobiles will continue. In all but the lowest density environments there will be greater efforts to improve the efficiency with which scarce street space is used. As for mass transit, these systems from the last century will continue to serve an ever smaller share of total urban travel, regardless of the level of funding of these programs.

The Entrance of Women Into the Workforce

Throughout the post-war era, women have been entering the workforce in record numbers, and this trend is expected to continue for many years to come. In 1950 about a third of adult women worked, by the year 2000 the proportion will be three fifths During the 1990s, women will be more than three fifths of the net new entrants into the workforce, as an ever-greater share of women leave home for paying jobs.

From the point of view of the nation's transportation system, women at work have had a number of important impacts. First, they have increased the numbers of journeys to work, and the peaking of those journeys at the traditional rush hours. More than sixty one percent of the population now holds paying jobs, an all-time record, and more than 85 percent of full-time workers still have schedules built around the traditional 9-5 workday, and the five day week. At the most basic level, then, women at work have increased the demand for highway space at the peak hour.

Related to this, and of even greater importance, women in the workforce have increased the premium that society assigns to time and convenience. It is no secret that the two-earner family has plenty of money and not enough time. With two jobs in the paying workplace, and another one managing a home and family, millions of families find that leisure or free time has become the scarcest commodity. Indeed, Harris surveys report that most people report that they have much less free time today than they did fifteen years ago.

As a result we see the explosive growth of all sorts of convenience industries. The home, for example, has been turned into a sort of dispersed hotel industry with a combination of day care, lawn care, fast food, maid service and the like completely replacing the job of the home maker. And we see the premium placed on time increasingly affecting every sort of decision, ranging from where to shop, to where to live or what sort of transportation system is preferred.

From the point of view of shoppers, or commuters or weekend travelers, time - measured from initial departure to final arrival - has become the single most important aspect of a satisfactory transportation system. The important questions in transportation have become: How long does it take to get to work? How long does it take to get in and out of the parking lot? How long does it take to travel to Los Angeles or Chicago or to the beach or the mountains? The answers to these questions determine the price of housing, the success or failure of shopping malls, the locations of new businesses, and the perceptions of the quality of life in cities and towns across the country. In some cases the answers determine the electoral success of politicians as delays and congestion become voting issues.

Although we may lament the trends, and long for a slower more peaceful era, the economic imperative is clear: We must hurry up or get run over. Time has become the key factor in economic success, as well as in private perceptions of the quality of life. A transportation system that cannot move goods and people faster in the next century than it does today will be judged a failure.

General Implications

In reviewing the broad implications of these demographic trends on our future transportation needs, two factors stand out. First, the demand for transportation in our society is becoming ever more diffuse and dispersed. As the geographic center of our population has shifted south and westward, and the concentric growth around our cities has expanded, the places where we live, work and play have become more spread out. The growth of leisure is adding another dimension to this dispersion, as we gradually populate once remote mountain tops and isolated beaches. This dispersion is both a product of, and a captive of the automobile and the truck. Although it is conceivable that radical changes in energy prices could change this pattern, such changes do not seem likely. In Europe, for example, where gasoline prices at the pump are several times U.S. levels, a similar, though less advanced trend toward dispersion is observable. In the 1990s, we will depend more and more on highways, automobiles and trucks. We should not fool ourselves into thinking that federal investments in other modes, or modest changes in gasoline prices will changes this pattern.

Second, our economy is demanding ever-faster transportation systems, as the value our society assigns to time rises. In the decades since the development of the jet aircraft and the super-highway, point-to-point travel times have changed little. For highways, actual travel times may have risen because of the 55 mile-per-hour speed limit and growing suburban congestion. But the demographics argue that the nation we must prepare to move is a nation in a hurry, what we might call "an impatient society." America in the next century will be a place where everyone works, where the value of paid time and leisure time has risen, where goods have become lighter and more expensive, and where fast, high quality services dominate the economy. We must strive to develop systems that move things and people faster, with fewer unexpected delays.

A Transportation Agenda

How should we develop our transportation system to serve this society? The transportation challenges of the 1990s and beyond can be summarized in two broad categories:

o First, we need to make some modest expansions and extensions of our transportation system to serve newly emerging origins and destinations.

o Second, and more important, we must improve the efficiency of existing systems to increase speeds, reduce travel times and reduce congestion.

The first category of improvements is the traditional one: capacity expansion. It includes providing new highway and air service in the growing cities of the South and West, and to the still expanding suburban rings of many cities. It includes upgrading access to ports, airports, and resort areas that will account for an increasing share of travel as the population ages and international trade and travel grow.

The second type of investment, aimed at improving the speed and efficiency of the traditional transportation network, represents by far the greatest challenge and the greatest opportunity for the foreseeable future. A number of barriers have kept us from systematically improving our existing systems. First, the nation has been lulled into believing that because the major systems are complete, that there is little else that needs improvement. Instead of setting ever-rising targets for service quality and speed, public policy makers been content to focus mostly on system maintenance and preservation.

Secondly, responsibility and funding for transportation improvements remains extremely balkanized. At the national level, the various transportation modes, and their funding mechanisms exist as separate companies, separate bureaucracies, and often separate facilities. Like our health care system, no one is responsible for the performance of the system as a whole. At the state and local level the divisions of responsibility often reinforce narrow thinking and parochial views. Airport operators, who prosper on parking revenues, have little incentive to reduce overall travel times by reducing auto congestion or providing better transit service. State departments of transportation often invest aggressively in highways to meet expected growth in demand, but have no direct interest in the land use planning that controls future demand.

As a result we have systematically underinvested in the nodes of the transportation system that link modes together and create true systems out of disparate elements. It is noteworthy that the most substantial improvements in the quality of transportation services that have occurred over the past several decades were the result of private investments in more efficient hubs: automated overnight delivery service facilities; container ports; airport hubs; private truck warehouses; and automated rail yards.

Even the data that are used to guide planners reflect these limited perspectives and jurisdictions. Public agencies know a great deal about miles of highway, the numbers of freight cars the railroads own and the number of passengers who board the airlines each day. But we know very little about average commuting times and speeds, the trends in freight shipment costs and reliability, or the ways in which travel delays could be reduced by redesigning airports and their access systems.

What should be done to overcome these obstacles?

Four steps are most important:

o First, we must develop a new set of understandable transportation service goals, along with the data collection capabilities needed to chart progress toward them. We need to be constantly made aware of how our system is performing, particularly in comparison with other nations, on such measures as commuting times, average air travel times (not just numbers of delays) freight costs and delivery times, mail delivery times and other performance indexes. These measures need to be coupled to estimates of delay costs, capital costs and other macroeconomic indicators to help in the evaluation of new investments. In business there is an old adage: "What gets measured gets done." To make progress in transportation we have to start measuring the right things.

o Second, we should adopt more market-oriented strategies for solving transportation problems. At its simplest this means allowing private companies and entrepreneurs to invest in, and develop the transportation network, including toll roads, experimental highways, and even the air traffic control system. Over the past several decades private investors have been responsible for most of the innovation and improvement in the nation's transportation network, and these results should be encouraged and supported by federal policy. Where facilities and systems remain in public hands, greater experimentation should be encouraged with such things as congestion pricing of roads and airports. Optimization of the existing transportation system to minimize the amount and costs of congestion virtually requires the use of private investment decisionmaking tools, and the use of pricing rather than queing mechanisms to allocate resources.

o Third, we should create new funding mechanisms that bridge modes and jurisdictions. While some flexibility has gradually been built into federal programs funding highways and transit, most transportation funding continues to be directed to specific modes and specific agencies of government. At least some portion of any increase in transportation spending should enable states or metropolitan areas to attack their transportation problems with the broadest possible discretion and the greatest attention to the overall performance of their systems.

o Finally, we should invest in the development of information tools that can enhance transportation system performance. Despite the claims of enthusiasts, there is no near-term technical fix that can substantially enhance the speed, reliability or cost-effectiveness of the current system. The bold innovations on the horizon - from hypersonic aircraft to magnetic levitation trains - are each too expensive, or too limited in utility to provide a broad solution to existing transportation problems. Instead, the innovations that have the most promise involve applying the great technical revolution of the late 20th century -- cheap, high-performance computers -- to transportation systems that were developed decades or even centuries ago.

The same combination of improving price/performance ratios for computers and software that generated such spectacular productivity gains in other industries has created great, but as yet largely unexploited opportunities in transportation. For example, existing information technologies could be developed to automate airport check-in (perhaps from the car on the way to the airport) to control the flow of trucks to urban loading docks, to collect tolls or levy fines for traffic violations, or to prevent congestion on urban streets among other possibilities. Advances such as these are particularly attractive because they involve mostly private sector investments. But as an owner of large portions of the system, the federal government should be prepared to invest in research and development to improve the efficiency of the network.

The next two decades will not witness any revolutions in transportation systems or technologies. But the intelligent application of existing information technologies to transportation holds the promise of gradually transforming the efficiency and productivity of the nation's transport network. By doing so, transportation planners can measurably improve the nations economic performance and its quality of life.